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CAMERON'S ROUTE FROM LAKE TANGANYIKA TO THE WEST COAST OF AFRICA.

A FEW remarks on the map illustrative of Cameron's remarkable journey from Lake Tanganyika to the west coast of Africa may not be inappropriate. It is a copy, as far as concerns Cameron's route, of that traveller's own map, published with commendable promptness by the Council of the Royal Geographical Society. From the lake to 'Nyangwe, on the lower Lualaba, Cameron travelled for many miles in the track of Livingstone. The main features of this part of the country, as they appear on the maps of both explorers, agree, though there are considerable differences as to details. On Livingstone's map the distance from the lake to Meketo amounts to 23 miles, on Cameron's to 40 miles; and from the Rubumba to the Katamba it is 51 miles according to the former, but only 35 miles according to the latter. The difference in the position of Nyangwe is far less than might have been expected. Cameron, from careful observations, places that town in lat. 4° 12′ S., long. 26° 31′ E., Livingstone in lat. 4° 10′ S., long. 26° 5′ E. The difference in longitude therefore amounts only to 26 minutes, and not to 90 miles, as stated by Cameron, who had not Livingstone's own map with him.

At Nyangwe Cameron collected information with respect to the lower course of the Lualaba, which makes it all but certain that this river is the Upper Congo. He then turned to the south, and as far as Kassabi he travelled through a country never before visited by a scientific traveller. Indeed, his track is crossed only by those of the Pombeiros and of Ladislaus Magyar. The former crossed Cameron's route somewhere about latitude 10° 15′ S., for we venture to identify their Lubiraji with Cameron's Lubiranzi. In the course of their journey eastward the Pombeiros then crossed the Luburi, laid down on Cameron's map, then the Lufula or Lunfupa, mentioned by him in one of his letters as an affluent of the Lualaba, and then the true Lualaba itself. Thence the town of the Cazembe, the route of the Pombeiros may now be laid down with a considerable amount of confidence. Cameron ventures to identify their Cavula Nganga with Kalamchongo, an affluent of the Kamòrondo. L. Magyar crossed Cameron's track further to the south-east, and then turned to the north, following the banks of the Lulua, which he traced nearly to its junction with the Kassabi. Cameron's journey has shed a flood of light upon the hydrographical features of that portion of Central Africa, and much of the native information collected by Livingstone now becomes perfectly intelligible to us. There can be no doubt that Cameron himself is in possession of information not yet embodied in the preliminary map forwarded by him.

The greatest chief met with during this portion of Cameron's journey was Kasongo, at whose capital, Kilemba,* he was detained for a considerable time. He describes him as the "big chief of all Urua." There can be no doubt of the identity of Urua and Rua with the country of the Molua, whose "big chief is the Muata Yanvo residing at Kabebe,† the position of which we know approximately from the visits paid to that capital by the Pombeiros and Graça, and from information collected by others. But whatever doubts there may exist as to the *exact* position of Muata Yanvo's capital, it is obvious that it cannot be identified with Cameron's Kilemba. The big chief, therefore, who resides in the portion of Urua through which he came, is a vassal of the bigger chief at Kabebe, or was so formerly. Ulunda (Lunda) is another name for the dominions of the Muata Yanvo, given to it by the tribes towards the west, and, according to L. Magyar, its meaning is "extensive country, full of desert places."

On approaching the Kassabi, Cameron came across Livingstone's old track. According to the latter, the Kalombo enters the Kassabi in about long. 21° 43′ E. according to Cameron in long. 21° 13′ E., a difference of 30 minutes. Lake Dilolo has been placed by Cameron in long. 21° 20′ E., whilst Livingstone places it in long. 22° 27′ E., but the direction in which this lake lay can only have been pointed out to Cameron, as he passed about 10 miles to the north of it, and we therefore prefer to retain its relative distance from the Kassabi ford, as given by Livingstone.

Thence to Chikumbi's, near Pehu, Cameron travelled partly along one of L. Magyar's routes. Both crossed the Luwati (Lu-ati), an affluent of the Lumeji. The continuation of Cameron's route to Bihe and the coast has not yet reached us.

E. G. RAVENSTEIN.

* This is the name of his capital according to L. Magyar. The Pombeiros, and quite recently Lieut. Lux, speak of it as Musumba; Graça calls it Kilombo (Kilemba), but the meaning of these two latter names is apparently merely "residence" or "capital."

† We have been anticipated in this by that veteran African geographer, Mr. Cooley, in the *Athenæum*.

THE IRRIGATION OF FIROZPÚR.

THIRTY years ago there was a death struggle on the banks of the Sutlej. All through the winter months of 1845-46 there were the roar of cannon, the rattle of musketry, marching and entrenching, the shouts of combatants and the groans of the dying. At Mudki, on December the 18th, 1845, the exhausted British troops were attacked by the flower of the Sikh army. In the more deadly struggle for the entrenchments of Firozshah on the 21st a drawn battle only just averted an overwhelming disaster to the British arms. On the 28th Sir Harry Smith won the field of Aliwàl; and at length the Sikh invaders were crushed at Sobraon on the 10th of February. The work of death went on bravely, and thousands of corpses formed the winter crop of 1845 in that district of Firozpúr.

In the winter of 1875, after thirty years had past and gone, there was again the marching of many men over the district of Firozpúr; and the old battle-fields re-echoed once more with busy sounds. But they were no longer the forerunners of death and destruction. British officers were leading, but not to the storming of entrenchments nor to the charge of hostile ranks. There has been a great change; and now the object is to convert those battle-fields into gardens. All the villages were turning out to the sound of music, under perfect discipline, and digging steadily and with cheerful zeal. The smallest boys caught the enthusiasm, and busily carried small baskets of earth, while the oldest men, who were in their prime when Mudki and Sobraon were fought, come out to smoke their hukahs, comparing the old times with the new. In the morning streams of women wended their way from the villages, and were seen converging to the canals, bringing food to husbands and brothers, and the whole district was astir.

In truth, a very remarkable and noteworthy piece of work was done in Firozpúr last year, in the construction of a complete series of irrigation canals by the villagers themselves, under the guidance of their own head-men, and on a system organised by the district officers. This work shows that the people are willing and ready to do their part in the introduction of agricultural improvements, provided that they are convinced of their utility; and it proves that the village system, the immemorial local government of India, is efficient, not only as regards current work, but also in the organization of special arrangements for a great emergency.

The district of Firozpúr stretches for 105 miles along the southern bank of the Sutlej, which here forms the arc of a circle, flowing from the east northwards, until it receives its tributary the Bias, and then bending south and west in its course to the Indus. The district covers an area of 2692 square miles with a population of 549,253, in 1312 villages, or 204 to the square mile. The number of inhabitants to a square mile in the Punjab is 173, for all British India 165; so that the populousness of Firozpúr is somewhat above the average, But the rainfall of the district is only 15 inches in the year, and irrigation is, therefore, a necessity. The district is divided into three *tahsils*, called Zira to the east, Firozpúr in the centre, and Muktsar to the west.

The current of the Sutlej is rapid, the fall of the river being 2 feet in every mile; and the fall of the country is in the direction of the river's course, which renders it peculiarly suited for the construction of canals. The Sutlej has not always flowed in its present bed. Once its course was along the *Dunda*, a high bank passing to the south through the native state of Faridkot to Sirsa, but this was in very ancient times. Another high bank, nearer the present river, runs through the district from east to west in a very sinuous course, and is called the *Sukha*. The whole tract between the new and the old beds is intersected by water-courses and depressions. A river cannot leave a well-defined bed without making an effort, now and again, to return to its former haunts by cutting a new channel into its old course; and these channels are naturally found in the greatest number near the present bed. Further away their banks are levelled by the rain, and now exist merely as depressions. These old channels play an important part in the new canals, which as a rule run parallel to the Sutlej. The history of the changes in the courses of the Sutlej and Bias has been traced out, in a most valuable and interesting paper in the *Calcutta Review*, for July 1874, by Surgeon-Major C. F. Oldham—entitled "Notes on the Lost River of the Indian Desert."

Soon after Captain Grey took charge of the district as Deputy Commissioner, in March 1874, he satisfied himself that the rainfall of 15 inches, if seasonable, was adequate for the light soils south of the *Dunda* or ancient bank of the Sutlej, but that it did not suffice for cultivation on the superior clayey soil of the strip, averaging 15 miles in width, which intervenes between the *Dunda* and the present course of the river. The area of this tract is nearly 250,000 acres of *khadir* land (called *bhet* in the Punjab), that is of low land that owes its depression to having once been the bed of a river, or levelled in some way by the influence of river action, as distinguished from the *bangor*, or higher lands. In consequence of the want of irrigation, 100,000 acres of *khadir* land, in the Zira tahsil alone, yielded crops only in exceptional years, and vast tracts in Firozpúr and Mamdot suffered from the same cause. This great need has been constantly represented ever since Mr. Brandreth made his Settlement Report in 1852, but the Public Works Department has always had too much to do elsewhere. Captain Grey, therefore, determined to see whether the people, under their own head-men, could not execute the work themselves; and the question has been most satisfactorily solved.

The irrigation is partly supplied by inundation canals, that is by canals which are filled when the rivers are in flood. Such perennial canals as can only be constructed at vast expense and when great engineering skill can be obtained, are necessary for the high rainless *bangor* tracts between the Punjab rivers. But for the *khadir* lands the inundation canals and less expensive perennial canals suffice, and have been in use from time immemorial, especially in Multan and Sind. Their construction in Bawalpúr, lower down the course of the Sutlej, under the able superintendence of Mr. Barns, was watched by Captain Grey when he was serving in that State, and an account of them will be found at page 495 of our number for March 1874. They are more fully described in the *Indian Moral and Material Progress Report* for 1872-73, p. 52. For the similar

work in Firozpúr, Captain Grey was so fortunate as to obtain the aid and advice of Mr. Barns, who brought his Bawalpúr experience to bear on the needs of a similar region; while the details were arranged by Mr. H. C. Fanshawe, then Assistant Commissioner of Firozpúr, under Captain Grey. Mr. Fanshawe, a young and very able civilian, had already won his first laurels gloriously, in the great silent battle with the Bengal famine. Two native engineers, named Hari Singh and Roshen Dos, were lent from Bawalpúr.

It is extremely interesting to read how the irrigation of Firozpúr was effected through the existing machinery of the ancient village system. In each of the three *tahsils* there is a native *Tahsildar*, or revenue officer, under whom are the village officials. Every village has its *Lambardar*, or head-man, and its *Patwari*, or accountant; and it is mainly due to the zeal and ability of these officials that the undertaking was so successful. The native engineers began by running levels from the bench-marks of the Great Trigonometrical Survey, and by making a survey by which Mr. Barns aligned the canals. Then was commenced the work of calculating the amount of excavations, preparing specifications (*hidáyats*) and accounts, and drawing up the complete estimates (*hisab-ihdasi*) of all the canals.

The estimates were sent to the *Tahsildars* with full instructions. They gave the depth, width, area of the sections, their cubic contents, and the cost at 2½ annas per 100 cubic feet, for each length of 330 feet throughout every canal. For dykes they gave the height, top width, base of slopes, sectional area, the length and cubic contents for each portion of work between points where the dimensions changed, and the total cost at the rate of 5 annas per 100 cubic feet rammed. Copies of the *Dastúr-ul-amal-anhar*, a handbook composed by Mr. Barns for use in Bawalpúr, were also supplied to the *Tahsildars*, who received full instructions and were first taken over the ground.

Then the *Tahsildars* apportioned the work to the villages or *mauzas*, which were divided into two classes: 1st, those receiving the fullest advantages from the canals, called *abnosh* or "water-drinking" villages, and 2nd, those which only got surplus water, or water obtained from a secondary channel or *kasi* a mile long, called *ghair-abnosh*, or "non-water drinking." The unit of labour, called *cher*, is one man, represented by 2½ annas of labour a day, or 100 cubic feet of excavation. The first class villages were to supply one *cher* for every twenty-five *bigahs* of their land, the second class gave one *cher* for every fifty *bigahs*. The villagers who did not benefit, and were called in to help, received payment at the rate of 2½ annas for every 100 cubic feet excavated.

All these details were settled by the *Tahsildars* to the full satisfaction of the villagers; whose work was arranged on a regular system. Each mile surveyed was divided into 16 portions, or lengths of 330 feet each, and, according to these lengths, the area of excavation was given out. The lengths were called *duks*. At the head of each *duk* there was a peg, and on either side other pegs, and here was the sole cause of complaint. For some of the people found that the pegs made capital firewood, and there was much trouble in protecting them. On the pegs were written the name of the village, and the depth of the required excavation. For every 3 miles there was a *Patwari*, or village accountant, as overseer. Each *Lambardar*, or head-man of a village, had a stick given him which showed the depth of the excavation on his *duk;* and the first thing the villagers always did was to divide their *duk* into sub-lengths among themselves, and all worked with a will, while the *Patwaris* moved up and down constantly to encourage the people, and measured the work every day. The villagers brought their own hoes and baskets, and there were to be seen every size and shape of mattock, every conceivable shift for a basket. In a few places they used *kurahas*—implements drawn by bullocks for scraping up soil, which do the same amount of work as fifty men with baskets. The people were very merry among themselves at the work, and those of Fattehgarh, one of the larger villages, came down 350 strong, preceded by a drum, and worked to music, returning home in noisy triumph when their share was done.

But the people did not give their labour and time only. Those who could afford it advanced their money also; and without timely loans from the Raja of Faridkot, the Sardar Suchet Singh, Lala Telu Mal, and Rai Gopi Mal, no canals would have been running in 1875. All these loans have been repaid; and the accounts were clearly and well kept, and regularly checked by Lachmi Narain, the intelligent clerk of the district fund. The money for wages was paid to the *Lambadars*, who paid it among the *asamis* (or cultivators) according to the work actually done, with exact justice, so that not a single complaint was heard.

In the excavation of canals the most important point was to get the workmen to carry the earth to the required distance on either side, but this they readily did. The *bunds*, being the keys of the canals, were constructed very carefully, each under the special charge of a *Patwari*. First the foundations were dug along the whole length, 3 feet wide by 2 deep, and the earth was well rammed with wooden rammers. In front there is a strong revetting of brushwood, secured with stout poles. These bunds have already stood the heavy floods without deterioration. The excavated earth generally served for the canal embankments, which were in some places also strengthened by revetments. The canals were opened as soon as there was a head of 2½ feet of water at the mouth, ready to come into them.

There are two classes of canals, those whose beds are dug below the cold weather zero of the river, and which are consequently perennial, and the inundation canals which only receive flood waters. Altogether ten canals were constructed, three in the Zira *tahsil* under the able and zealous *Tahsildar* Aga Muhammad; four in the Firozpúr *tahsil* superintended by the *Tahisldar* Maya Das, and three in the Muktsar *tahsil*.

Commencing from the east, the two first canals in Zira are taken from the Sutlej a short distance from the battle-field of Aliwàl. The first, which is only an inundation canal, was named the Aga-wah, out of compliment to the energetic *Tahsildar* of the district. At the eleventh mile it is bunded, and divided into two branches, 24¾ and 13½ miles long respectively, the northern branch flowing, unassisted by excavation, down the old *Sukha* bed of the Sutlej. The Aga-wah was completed and opened on the 25th of last June, since which time it has run gaily without let or

hindrance. The second canal in Zira is called Daulat-wah, after the liberal young Sardar of Dhara Singhwalah, through whose villages the canal flows, and who subscribed Rs. 5000 towards its construction. Work was commenced upon it on January the 30th, and it was opened on April the 16th, 1875, as was also the third Zira canal, called the Bachera-wah. The three Zira canals are 49¼, 36, and 34 miles long respectively, altogether 119¼ miles of canal in this *tahsil*.

In the Firozpúr *tahsil* there are four canals. The first, 30¼ miles long, is called the Barns-wah, out of compliment to the eminent hydraulic engineer in charge of the Bawalpúr irrigation, who aligned the canals. Its mouth is close to the battle-field of Sobraon, and one branch, called the Shahr-wah, flows to the Makhu gate of the city of Firozpúr. The Mya-wah, so named out of compliment to the *Tahsildar* of the district, has its mouth close to that of the Barns-wah; and the other two canals of this district, 17½ and 22 miles long respectively, are called the Buta-wah and Jalal-wah.

In the Muktsar *tahsil*, farthest to the west, the three canals have an aggregate length of 62⅝ miles. The longest is called Nizam-wah, after Nizam-ud-din Khan, the only son of the late Nawab of Mamdot, who paid the cost of the canal—Rs. 20,156. The other two are named Panja-wah and Bagge-wah.

Thus ten canals now extend from one extremity of the district of Firozpúr to the other, without a break, the tail of one overlapping the head of the next for 110 miles, and extending to 6 or 8 miles from the river. Irrigation will be supplied to 400 square miles by the gradual development of distributing channels; but as a rule distribution arrangements are not fairly developed until the third year. There is a total length of 257 miles of water-course. The number of cubic feet of earth that was excavated was 44,039,645; and 54 bunds were constructed, containing 3,552,843 cubic feet. The whole cost of the works to the district fund was Rs. 22,563, which will easily be recouped in five years. But the moral results are still more striking. All was done by the district officers, who displayed vigour and public spirit, and went through those laborious months with unflagging persistency and without a murmur. Never before had the Government been drawn into such close relations with the villagers; and the people have learnt for themselves what great things may be accomplished by systematic and combined efforts. Nor did a single man grudge the labour given.

Mr. Fanshawe concludes his able and most interesting report by saying that "to see the people of the villages happy in their unusual prosperity, to see them brought into close and friendly relations with all the government officials, to see them place implicit belief in the Government's good faith and good intentions towards them, would more than amply compensate for a much severer degree of work than that experienced this year in the Firozpúr district."

The operations of man have a great and powerful influence on the changes which take place over the earth's surface, either for good or evil. Among the beneficent agencies the work done round the scenes of those famous battle-fields on the Sutlej is certainly worthy of more than a passing notice. It reflects high credit on all who were concerned in its execution from Captain Grey and Mr. Fanshawe, and their energetic *Tahsildars*, down to the humblest villager who, with hoe and basket, laboured zealously and cheerfully for the good of the common weal.

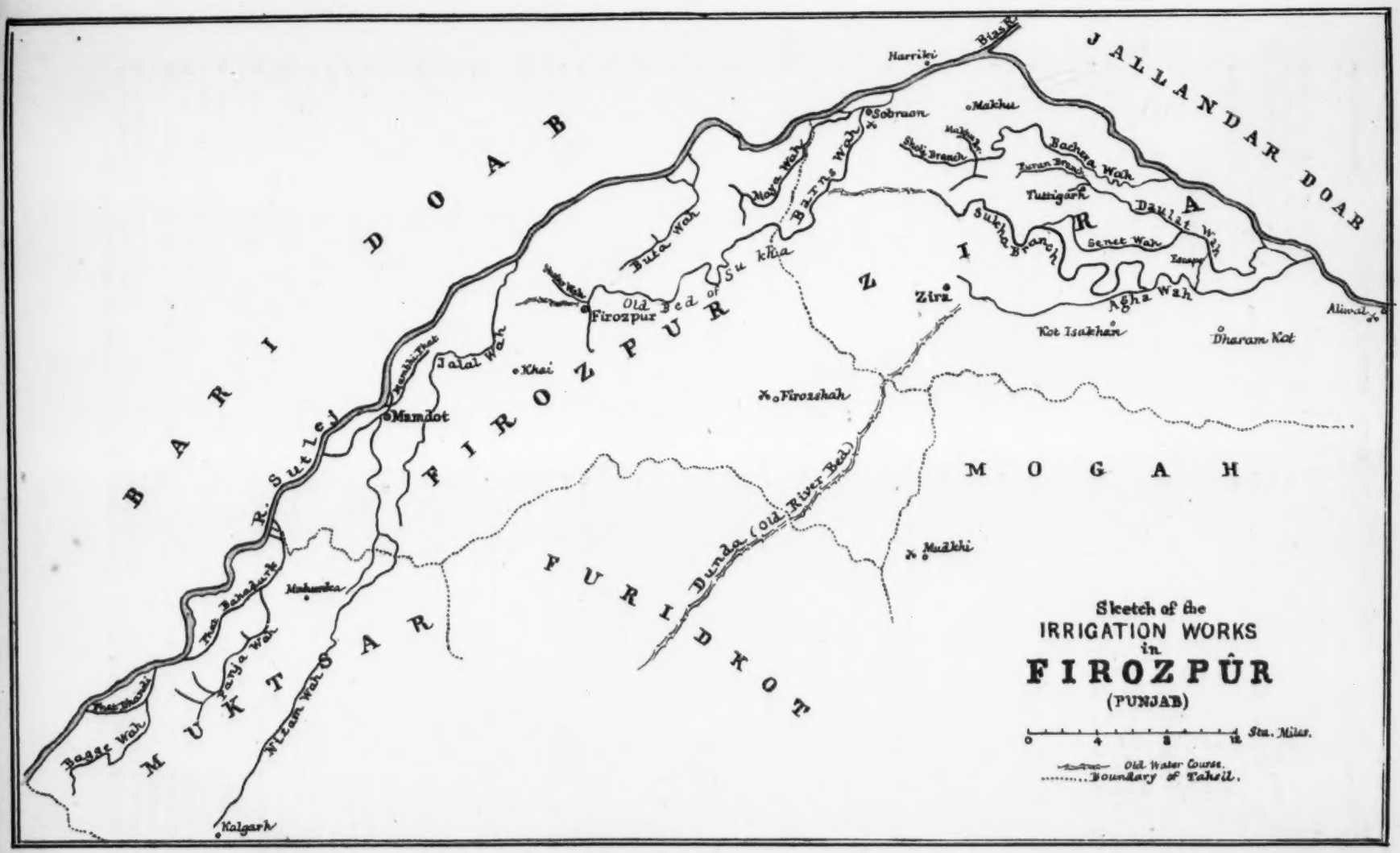
CLEMENTS R. MARKHAM.

THE WORLD'S FUTURE COAL DEPÔT.

IT was said by the First Napoleon in one of his characteristic bursts of rancour against "perfide Albion," that the great resources of Britain were "but as mines of coal or sulphur in the hands of savages." When the great conqueror thus reviled the then leading coal-market of the world, he had probably no guess that, within fifty years, a literal interpretation would be given to his bitter metaphor by the fact of the two greatest existing supply-fields of coal being in the hands, if not of actual savages, at least of nations too imperfectly civilised to appreciate and utilise their priceless inheritance. It may be worth while to cast a passing glance at the capabilities of these little-known but now all-important sources of supply, and the conditions under which they at present exist.

To begin, then, with China. There can be no doubt that the "fossil empire" contains a practically inexhaustible store of fuel, even without reckoning the coal-fields yet to be discovered among the mineral abounding spurs of the Tian-Shan Mountains,* and along the southern slopes of the Altai. But all these treasures are rendered useless by the time-honoured "dog in the manger" policy characteristic of that Dead Sea of humanity. To leave their possessions unimproved, to repel indignantly all offers of improvement by others, to shut out foreign enterprise and foreign capital like some virulent epidemic—such has been the stereotyped policy of the Celestial Conservatives from time immemorial. The Convention of 1869, it is true, engaged the Chinese Government to "open three coal-mines at points the nearest to the sea-coast or to a treaty-port, and easily accessible to ships"; but this agreement, like most other agreements concluded between ourselves and these slippery Asiatics, has proved merely a dead-letter; and there is at present (so far as I can ascertain) no part of China except Formosa where native coal-fields are being worked by foreign enterprise. Moreover, even were it otherwise, it is not to this remote quarter (as Sir Rutherford Alcock has very lucidly pointed out) that we are to look for the future supply-mart of the world, and the threatened rival of our own markets. "I do not," says the late British Minister in China, "in the least believe in any supposed 'danger of exhaustion of the world's reserves of coal.' Were there no other coal-fields than those of China, this danger could have no existence; and America appears to be hardly less rich in stored-up fuel, both solid and liquid. But, although the Chinese coal may be as good as any we possess here, yet, whatever its cheapness at the pit's mouth—say 10*s.* or even 5*s.* per ton—there must be added at least *as much* for its transport to the port of shipment, and 3*l.* for freight, as well as 7*s.* or 10*s.* for carriage to the cellar or the factory in England. How

* Coal has been discovered in considerable abundance on both sides of the great chain, and efforts are being made (not very successfully) to promote the regular working of it.


BARI DOAB
JALLANDAR DOAB
FIROZPUR
ZIRA
MOGAH
MUKTSAR
FURIDKOT
Harriki
Sobraon
Makhu
Bzstre Wah
Maya Wah
Tura wah
Old Bed of Sukha
Old Firozpur
Zira
Sukha Branch
Bochara Wah
Tussigarh
Daulat Wah
Agha Wah
Kot Isakhan
Dharam Kot
Alimal
Mandot
Khai
Jalal Wah
Firozshah
Dunda (Old River Bed)
Mudki
Mahuana
Kalgarh
Sketch of the
IRRIGATION WORKS
in
FIROZPUR
(PUNJAB)
0 4 8 12 Stn. Miles.
Old Water Course.
Boundary of Tahsil.

would this avail us, then, when what is required is an unfailing supply of coal not averaging more than half this cost?"*

How, indeed? And moreover, in pursuing such speculations, we are merely imitating the sage who spent an hour in fruitless search for the spectacles which were snugly planted on his nose all the time. In contemplating the possible riches of China and America, we forget altogether that within four days' journey of London there exists a magazine of fuel capable of supplying the whole world for centuries—viz., the coal-fields of Central and Southern Russia.

It must be owned, however, that if Russia's boundless mineral treasures are not yet appreciated as they deserve, no small share of the fault is her own. The years which have passed without any effort being made to utilise these invaluable possessions, might well make any outside spectator doubt their very existence. Five years ago, the ordinary tourist's first idea of the existence of a large store of coal in Russia was imbibed when the Volga-Don railway deposited him at Kalatch, and he saw lying around the steamer, in place of the split logs which had served as fuel on the Volga, the whole way from Nijni-Novgorod to Tsaritzin, huge, black, shining mounds of splendid coal. The recurrence of the same phenomenon at every halting-place along the Lower Don, from Kalatch down to Rostoff at the mouth of the estuary, would doubtless confirm him in the belief that coal must be pretty plentiful somewhere in the neighbourhood; but even then he would probably have no suspicion that he was actually in the midst of a coal-field larger than many a European principality, and containing a supply of fuel which, both for quantity and quality, may challenge comparison with any in the world. Yet such is actually the case. The tract technically styled "The Don Basin" has a superficial extent of 16,000 square miles, and is estimated to contain 15,000,000,000 poods† of the finest anthracite, leaving in burning a residuum of ashes not greater than two per cent! The same enormous amount is credited to the great central coal-field (known as the Moscow Basin), which extends from the sources of the Don as far northward as the Dwina, comprising the various coal-beds in the Governments of Moscow, Tula, Kalouga, Riazan, Tver, and Novgorod. In Poland, the contents of the Government coal-fields alone (without reckoning those worked by private companies) are stated at 516,000,000 poods. The Government of Kiev contains coal strata with a superficies of 80 miles, and a mean thickness of 21 feet. Numerous small fields have been discovered in the Caucasus, some of which, when I traversed the province in 1873, on my way to Central Asia, were already giving a very fair yield, though others (especially those around Kutais) had proved palpable failures. Add to all this the private workings in the "Privishinski Krai" (the country lying within the boundary of the Vistula) the anthracite beds of Kharkoff and Ekaterinoslav, and the fresh discoveries which are being constantly made in Eastern Russia—and we are equally amazed at Russia's inexhaustible resources, and her wilful neglect to improve them.

On the latter topic it is needless to dwell; for the bare facts of the Russian coal-trade speak for themselves more forcibly than volumes of criticism. From sheer want of transport a pood of Tula coal, which sells for 2¼ kopecks* at the pit mouth, costs 11 kopecks (thanks to the expense of carriage) in Moscow; and the same cause makes the famous anthracite of the Lower Don, which costs from 7 to 10 kopecks a pood at Novo-Tcherkask, close to the actual field, vary from 9 to 12 kopecks at Rostoff, from 12 to 18 at Taganrog, and from 20 to 21 at Odessa. Again, on the discovery in 1869 of new coal-beds in the Government of Tula, it was reported by the experts sent to examine them, that the mere construction of a connecting tramway from the mouth of each shaft to the nearest line of rail, would suffice to make the undertaking one of the most remunerative in Europe. As might be expected, the tramways were never made, and the working of the shafts has consequently all but stopped from sheer want of transport. The same cause has proved fatal to the working of two coal-beds in the government of Riazan, which (if the published report may be trusted) would have been able to supply the Morshansk, Saratoff, and Tsaritzin railways with 20,000,000 poods of coal yearly.

Nor is even this all. The Moscow-Tula railway actually began to use coal fuel in 1870, consuming upwards of 3,000,000 poods (at from 6 to 11 kopecks per pood) in twelve months; and the principal owners, emboldened by success, were already beginning to send large quantities of coal to Moscow itself, when (incredible as it may sound) the directors of the line, for reasons best known to themselves, gave orders for the resumption of wood fuel. The natural consequence was, that the works fell to decay, and the proprietors were all but ruined.

But this unpardonable neglect is no longer possible; for Russia's wasteful expenditure of her magnificent stores of timber is fast producing its inevitable results, and the great empire is now menaced by a "fuel famine" even more imminent and overwhelming than that which threatens ourselves. What would our readers say if suddenly informed that, at the present rate of consumption, the year 1929 will find not a single tree standing in Russia? Yet such is actually the case. Putting aside the statistics of the various provinces, which are too tedious and voluminous to be dealt with in a hasty summary like the present, it may suffice to state that, according to the most reliable estimates, the total amount of timber at present possessed by Russia is 193,354,000 *dessiatines*—the dessiatine being equal to 2$\frac{1}{10}$ English acres; and, the annual consumption being 72,000,000 cubic *sajens*† or about 3,600,000 dessiatines—a by no means extravagant estimate, if we superadd the wooden pavements, houses, palisades, sleepers, telegraph-posts, barges, boats, &c., to the total of mere "firewood"—it follows that, within fifty-four years, Russia's supply of timber will be exhausted to the last faggot!

At first sight, indeed, it might seem as if no contingency not actually imminent could be an adequate stimulus to the sluggish Slavonian nature; but (as those who were in Russia during the "wood panic" of 1872 will readily admit) the pressure which is now in process of being applied to our Eastern brethren is

* Letter on "The Coal-fields of China," published 1873. The pood is 36 lbs. English or about 40 lbs. Russian.

* The kopeck is ½ of a penny; 100 kopecks = 1 rouble.
† The sajen is 7 feet English.

such as even *their* supineness cannot resist. It is not generally known that more than two-thirds of the forests in Russia are crowded into Finland and the seven northern Governments, leaving the bulk of the central and southern provinces absolutely bare; and thus, as the stores of the North progressively diminish, the scarcity of fuel in the non-wooded districts, and its consequent dearness, become yearly more intolerable; and the Russian public is, not unnaturally, beginning to "halloa" for fresh fuel before it is "out of the wood" which has hitherto supplied its needs.

Under such circumstances, the far more equally distributed, as well as more plentiful, supply of coal existing in European Russia commends itself to public attention as a matter of course; and the best way of turning it to account has been suggested by Count Rostovtzeff, one of the first living authorities on the subject, in so concise and lucid a form as to be well worth quoting:—

"What we have to," says he, in his "Remarks on the Coal Question," published in 1872, "what we have to do is to give back, on the one hand, to the coal-owners themselves, that solid interest in the matter which they have lost through repeated disappointments; and, on the other, to secure such co-operation on the part of the Government and the manufacturing classes, as shall ensure a continuous and well-sustained demand. Three of the great trunk railways have already, within the last few months, agreed to use no fuel but coal; and the rest, with a cheaper rate of transport and an increased supply, would be only too happy to follow their example. Our two great obstacles are—1. *Want of confidence* in the coal-workings as a safe investment for capital; 2. *Want of transport* for the coal when wrought out. Till these are removed, nothing can be done."

"My plan," proceeds the writer, after giving various examples of the two counteracting causes abovementioned, "would be to form a company with a capital of 2,000,000 of silver roubles (about 300,000*l.*) with power to issue paper to a like amount in case of need. To this company should be conceded the right of search upon all lands belonging to the Crown, and the privilege of constructing railways to connect the workings either with the nearest lines of rail or with the actual centres of demand; the construction of such railways being held to be warranted by the certainty of a yield of from 12,000,000 to 15,000,000 of poods annually for a term of eighty years, with the prospect of a continuous demand to a like amount. The unprecedentedly rapid increase of our railway system, the yearly augmenting numbers of our factories, distilleries, &c., the new lines of river steamers which are springing up in every direction, and the project now in agitation of a steam merchant-navy on the Baltic, sufficiently guarantee us against any possibility of the supply exceeding the demand. Providence has endowed us with mighty resources; it is for us to develop and utilize them."

In another part of the same work Count Rostovtzeff goes even further than this, and gives us in actual figures his opinion of what Russia's annual consumption and exportation of coal *ought* to be (as compared with what it now is), if her mineral wealth were turned to proper account. "The total yield of our coal-fields during the past year," says he, "was only 14,347,925 poods; whereas, with greater facilities of working and transport, we could easily have disposed of more than 170,000,000 poods for Central Russia and the South alone, to wit:—Moscow, 26,000,000; Volga steamers, 40,000,000; railways, 34,064,000; factories, distilleries, &c., 49,315,000; Odessa, 3,359,000; the Black Sea and Egypt, 19,908,634; total 172,646,634 poods.

It will be observed that, in the above calculation, our authority makes no mention of a possible exportation to Western Europe—an omission doubtless arising from the difficulty of forming any approximate estimate, rather than from any doubt of the practicability of such exportation; for the subject has been before the scientific world of Russia for several years past, and is now universally regarded as a mere question of time. It must be remarked, moreover, that the Russian coal, though varying considerably in its quality, from the two per cent. residuum of ashes left by the anthracite of the Lower Don, to the twenty-three per cent. of some of the inferior beds in the north, is, as a whole, fully equal, if not superior to our own.

Such, then, being the mineral resources of Russia, what available means does she possess for turning them to account? At a cursory glance, her coal-fields divide themselves naturally into two great systems—the Don Basin as a source of supply for Turkey, Egypt, and the Levant generally—the Moscow Basin, as a magazine for the use of Western Europe. The latter is now brought within 3½ days' journey of London by the direct line of railway, opened three years ago, from Moscow *viâ* Smolensk to the German frontier. The coal-fields of the Kiev Government are now traversed by three lines of rail, the Moscow Basin itself by eight. The tramways so earnestly demanded by Count Rostovtzeff are actually in course of construction at last; while no fewer than six leading companies (not to mention others of lesser calibre) are setting themselves vigorously to the work of development. In a word, there seems little reason to doubt that the coal of Central Russia will be ready for Western Europe whenever Western Europe may choose to ask for it.

With regard to the Don Basin, the same thing may be said. Up to a very recent period, its only available means of transport lay in the single line of rail from Groushevka southward to Rostoff and Taganrog; but the rapid growth of the southern railway system is now fast bringing it into direct communication with Moscow itself, as well as with many other great centres of demand; while other causes are opening the way for a large and remunerative export trade with its foreign neighbours beyond the Black Sea.

At first sight, indeed, it would seem as if the want of a convenient port must delay, though not prevent, such a contingency. Odessa has no direct communication of any kind with the "Dorskai Bassein;" while Taganrog, the actual gateway of the Don, is a misplaced and inconvenient apology for a port, situated at the northern extremity of the Sea of Azoff, in water so shallow that large vessels are actually compelled to anchor at a distance of 12 to 15 miles from the town, and to employ light tenders in loading and unloading. But what neither Taganrog nor Odessa can furnish, seems now likely to be supplied in every detail by Sevastopol, which, under the happier auspices of the new régime, is

laying the foundations of a commercial greatness which bids fair to rival even its terrible renown as a naval port and fortress. Indeed, the famous battle-field appears to unite in itself all the qualifications necessary for such a purpose. Considered as a place of anchorage, it possesses a completely landlocked natural harbour, in which the whole Russian navy might ride at anchor; viewed in the light of a trading port, it lies within twenty-four hours' voyage of Constantinople itself, and is the nearest of all Russian seaports both to the Levant and the coast of Anatolia; while, as an outlet for the commerce of Southern Russia, it is already connected with the interior by a line of railway (which, if not actually completed, is at any rate fast approaching completion) passing through Simferopol, and crossing the Isthmus of Perekof, to join the Kharkoff-Taganrog line at Lazovo. These advantages are to be supplemented (in the words of the official report drawn up by the Sevastopol Commission) by "a commercial port occupying the southern and western sides of the 'South Harbour,' along which a space of 1020 sajens (7140 feet) is to be cleared for the purpose. In addition to this, the Commission proposes to construct along the western shore of the south harbour a stone quay of 650 sajens (4500 feet) in length, along which vessels of the largest size may lie comfortably for the purpose of loading and discharging; the smaller craft are to anchor on the southern side of the harbour."

It is true that when I last visited Sevastopol, two years ago, the great work appeared to have made remarkably little progress; and that (as the *St. Petersburg News* recently observed) "the future commercial importance of Sevastopol is as yet difficult to estimate, and there are even those who assert that its geographical position, and the desolate character of the region traversed by the Larzovo-Savastopol railway, must prove formidable obstacles to the development of traffic (more especially export trade) in that quarter." But such a scheme is too valuable to throw away; and there can be little doubt that, sooner or later, it will be fully carried into execution.

We have here, then—to sum up in brief the results of our survey—a practically inexhaustible supply of excellent fuel, within easy reach of Western Europe—a vast and yearly increasing system of railway transport—a capacious seaboard for export traffic, requiring fewer days to transmit its coal to Constantinople than England requires weeks, and connected with the principal seaports of the Levant by regular weekly communication—a spirit of enterprise which, however tardy in its awaking, has already given ample earnest of what it may one day accomplish. Taking all these things into consideration, there is little rashness in predicting, that the next generation may yet see that "semi-barbarous realm" which, barely a century and a half ago, the first of British statesmen could pronounce to be "of no moment whatever in the affairs of Europe," stepping forward to a place in the foremost rank of commercial nations, and challenging the supremacy of England herself as the chief coal-producer of the world.

DAVID KER.

THE TARIUNI LAKE IN FIJI.

THE lake on the summit of the island of Tariuni in Fiji is well worthy of a visit, and our party, consisting of three, all then residing in the north-east part of the island, determined to undertake the journey. Instead of proceeding by the route pursued by the late Commodore Goodenough, we decided upon traversing that part of the country previously unvisited. Providing ourselves with a guide and half a dozen boys, some of whom had experience in procuring birds and searching for zoological specimens, and having completed our arrangements, we made a start on a fine November morning from our cotton plantation of "Vuni Vasa" (the root of the Vasa tree), which is picturesquely situated at the mouth of the "Wai Bula" (waters of health) stream. Striking inland in a south-westerly direction, our path lay over undulating land, which soon brought us into the valley formed by the north and north-east spurs of the back-bone range, and through which the "Wai Bula" wends its way. My two companions, Messrs. Clay and Prince, were ardent explorers, the former an indefatigable sportsman, and the latter a student of nature. With two such friends and fine weather, I had for some time looked forward to traversing the mountain range and visiting the lake which was invested with terrors to the superstitious Fijian, and of whose famously large eels we had heard so much.

A pleasant walk of two miles now brought us to the snug little native village of Nai-tina-tina, situated in a lovely part of the valley (which is here very narrow) and close to the bank of the Wai Bula; it is shaded by surrounding shaddock trees of large size, some of which are covered with the luxuriant foliage of the "granadilla-vine," and "guava" trees were also abundant, but neither of these fruits were eaten by the Fijians. The houses, built in the usual style, of reeds, and mat sides with thatched roofs, were planted round with hibiscus, draccenas, and a few trees of the fan palm. Nai-tina-tina was once a populous town, but most of its inhabitants had fled, owing to their having been implicated in the murder of some "Tanna" men who were labourers on an adjacent plantation. At the time of our visit the approach to the town had been levelled and cleared into a fine wide road, for the purpose of playing "Tinka," a game causing much amusement and excitement, as it lasts for some days, and brings over the opponents as guests, who are usually the young men of some town not far distant. "Tinka" consists of scoring the distances attained by throwing a shaft made from a reed having an oval wooden head attached to it, in appearance not unlike a long arrow; it is propelled by the hand from the base, in the same manner as the natives of Australia throw their spears, but differing in that they use no implement in the hand. The shaft after reaching the ground skims along it for a considerable distance. They made an advance of many yards before throwing the shaft, and seemed pleased at our admiration of the graceful way in which it was done. The winners, I believe, provide a feast and make presents, besides indulging in much "chaff" at the expense of the losing side. The Fijians are a "merry" people, full of jokes and ever ready to have a laugh at any peculiarity in a new comer's physical appearance,

and through which he will probably receive a nickname: no offence, however, is ever meant. They are also adepts at mimicry, and are proverbially generous towards their friends and relations with any gifts they may receive.

A short distance above Nai-tina-tina we crossed the Wai Bula, close to where it receives an affluent from a more southerly direction. However, I must not leave it without mentioning that, though only about 30 yards in width, it is the largest stream on this island; its waters are beautifully clear, and course over a bed of water-worn stones in most parts very shallow. It abounds with deep holes in which harbour a fair quantity of fish. These can be taken with the artificial fly, and are excellent eating. Prawns also are moderately plentiful, and are caught by the native women. In this and the other fresh-water streams of Fiji Neritinæ are common—adhering to the stony bottom; and one species Neritina (sp.), with its thorny protuberances is very troublesome to bare feet in crossing these streams. I found a Neritina adhering to the leaf of a plant 200 feet above the level of the Wai Bula, which was the nearest stream to it.

Turning our faces westward, we ascended the gorge formed by the two spurs before mentioned, that on our left trending towards the town of Buma, whilst that on our right descended in the direction of Nai-sele-sele. During a two miles' walk, the murmuring of the Wai Bula on our left and below us was quite distinct. On a further height we caught a glimpse of the sea to the eastward, and the cool trade-wind from that direction was most refreshing. The spur being reached at an elevation of about 1000 feet, it was crossed, and then descending on the other side into a gully, we came upon a small clear stream on a flat, which delivered its waters from a height of some 40 feet into a circular basin below, looking very cool and pretty with the sunbeams slanting across it. Here we camped, had lunch, named the place Prince's Waterfall (in honour of our friend Mr. Sidney Prince), and reviewed the little we had seen during our journey, having now traversed more than 7 miles of country.

After ascending the gorge we found the country to be pretty heavily timbered. We observed the wild nutmeg and cassia trees, enormous turmeric plants, and several species of palms not seen on the lower lands. At this height, too, birds were more plentiful. A pretty one with yellow breast and black collar round the neck, having a pretty note, was occasionally seen through the thick foliage on high branches, but it being constantly on the move, we failed in getting a specimen here. The occasional clicking of the beautiful orange dove (*Chrysœna victor*), the barking noise of a pigeon (*Carpophaga latrans*), the notes of paroquets and smaller birds, together with the luxury of a cooler atmosphere and the absence of flies and mosquitoes—the pests of the coast—combined to form a charm not before experienced in Fiji. Objects innumerable attracted our attention and admiration, the handiwork of a beneficent Creator; but however desirous, we were not enabled to linger on the way, for we wished to reach our resting-place before dark.

During our stay at Prince's Waterfall we had sent two boys out with guns to procure pigeons, and they returned with such a plentiful supply that we sent a number down to the plantation. Our road now became exceedingly stony and muddy, which prevented our taking so much interest in the objects around us; besides, our guide informed us we were barely half way to the town of Dala-na-tete which was to be our resting-place for the night, and so wishing to reach it before dark, our only care was to mind where we stepped and hurry on. This was a tedious part of the journey, and, taking a leaf out of Prince's book, I dispensed with one garment and adopted in lieu a shawl round my waist. I now proceeded more comfortably, but was not sorry when we entered upon cleared and cultivated land, which betokened our near approach to the town, to the westward. Below us stretched the straits of Som-Somo, and beyond that the high lands of Vanua-levu. It was dark as we entered Dala-na-te-te, a native town. Prince, who was well versed in the etiquette of Fiji, was deputed to arrange with the chief for our being housed. Fortunately matters were soon settled and we were only too glad to have secured such comfortable quarters. Pigeons were soon stewing, and amidst our present comforts the hard road we had travelled was soon forgotten. Birds however had to be skinned and notes jotted down before retiring to a rest every one was so much in need of.

Dala-na-te-te consists of about a dozen houses, and for a Fijian town is very clean. It is situated on the mountain side directly above the coast town of Somo-somo, and about a mile distant from it a small stream runs, called (lower down) the Somo-somo creek. The natives told us there were plenty of fish in it; but a charge of dynamite the next morning in a deep pool only secured us three. It had been raining all night, and as it continued until noon all hope of ascending the mountain that day was renounced. Two of our boys had, however, been sent out with guns, and they brought back a good supply of pigeons and a few other birds. The natives, who crowded round us as close as they considered respectful, eagerly watched the bird-skinning, and Prince, who was engaged in this, had extemporised a first-rate table for the purpose by placing the fern boards over two native bamboo pillows, and sitting cross-legged in front of it, was soon very busy. Many were the questions as to our object in coming all this distance to see the lake; nor could they understand why we should care to go up the mountain to get birds, &c., as they said we could get plenty of them lower down. On enquiring the native names of the birds found on the mountains—the Kai Colós, or mountain towns-people alone were able to give us the information—the coast natives, some of whom were here, did not know them.

Before taking leave of Dala-na-te-te, I must testify to the great hospitality and kindness we received from its people, and which I have since heard endorsed by other Europeans, indeed it is a characteristic which might truly be said to belong to most Fijian towns. Food was constantly being brought to us, and the yams and taro were the finest we had seen. On leaving for our return home, after the ascent of the mountain and an occupation of the house for three nights, it was with feelings of great pleasure we made our presents of coloured prints and knives to the chief.

Setting off early in the morning, the Somo-somo creek, and another, the "Buti-levu," were soon crossed, after which came a sharp, steep "pinch" of

ascent of about 150 feet. It was nearly perpendicular, and "Sailor," a large and heavy Newfoundland dog, being second on the narrow track, it was rather unpleasant for his follower, when, near the top, he refused to move on, and had to be pushed and lifted up—no easy matter, as Clay soon found out. Once on the top we found ourselves on the track of Commodore Goodenough, which we found to be quite wide enough for three people to walk abreast on. A few minutes halt, to procure a bird and look for land shells, gave time for a messenger we had sent back to the town to overtake us. The day was beautifully fine, the air cool, and as it was now quite dry under foot, and the incline gradual for about a mile, our walk was very pleasant. On one of the trees was observed a very peculiar mantis, having a prawn-like tail: it was the colour of the bark on which it was found, the body and legs were fringed in a most perfect manner, and its back was very delicately marked. This we at once preserved, and it is now in the British Museum. The bush soon wore the appearance of that part which we had noticed at a similar height on the Nai-sele-sele ridge. The sportsmen were now pretty busy and moderately successful, the yellow-breast being one of those secured. With the exception of a few steep places now and again, the road continued to be good. Ferns were very plentiful; but as we got higher these were quite eclipsed by the mosses, which presented a strange but picturesque sight in clothing the trunks and branches of all the trees. We were quite in "wonderland," and the sight occasionally of some strange plant or moss led us as frequently off the path as we were on it. The timber trees here were more dwarfed and scantily distributed, whilst we for the first time observed wild bananas, several varieties of palms, and gigantic plants of the wild angona (kava).

Reaching the summit of a ridge it was followed for a short distance until a cleared space was come upon—where stood the house, still in good condition, which had been erected for the Commodore. It fronted the N.W., and to obtain a view the bush had been cleared away. Now should there be anyone who reading this cares about a splendid view, let him come here and he will soon forget any of the discomforts of a tropical mountain climb in the delights of one of the most picturesque panoramas imaginable. At our feet lay the gorges between the hills. On the spur of one we could trace our line of march; here was the little village where we had slept, with its cottages looking like dolls' houses; here we could distinctly trace out the positions of the different towns for a long way up and down the coast, and in front of us was indeed a lovely panorama, with the old story of "the blue sea" with its parti-coloured coral patches (which could be easily discerned). A coasting cutter was sailing into Somo-somo, the only speck upon the water. The background was made up of the islands of Vanua Levu, Kiowa, and Rambi—all looking as smooth and quiet as if they had no such things upon them as magnificent timber and splendid water streams. But not being able to linger here so long as everyone of us wished, and leaving in the house all our unnecessary baggage, we once more wended our way, knowing the worst was to come, and hastened to reach the lake. A cool and pleasant breeze was blowing, and the summit was not clouded (which is rather unusual), so that another steep ascent of about 200 feet did not mar the enjoyment of our surroundings. Here (as indeed was the case during our whole journey) we were hemmed in by the bush on each side, and constantly shaded from the scorching rays of a tropical sun. The summit was soon reached, and we found ourselves on one of the highest peaks of the island, 2200 feet above the sea level. The mosses were here even more luxuriant, and lichens abounded. Descending in a circular route toward the S.E. into the basin formed by the surrounding ranges, the path was found to be very bad, stony, exceedingly muddy, and traversed by the slippery and uncovered roots of trees. At the foot, and on our left, was a creek, which was the first water we had come across since leaving the creek near Dala-na-te-te, our supply for drinking having been carried up in the usual native way, that is in large bamboos. The stone on the bank of the creek was found to be slightly porous, and the water here quite still. A short, muddy walk now brought us to the foot of the basin, which is undoubtedly the crater of an extinct volcano. But, alas, we saw no lake, only the surrounding hills, and in front of us "rushes." We judged the basin to be about a mile and a quarter in length, and three quarters of a mile in breadth, of oval form, and lying in a N.W. and S.E. direction.

Now came the pinch, not in the shape of hills or declivities, "merely rushes." Our guide showed us a point of land some half a mile off, and by force of expression undoubtedly conveyed to us as plainly as so many words, "There you are." Clay started off to show us the way, and suddenly disappeared. On coming up he said he thought it must be swampy, and so we indeed found it, natives and all. One would go down to the waist as another came up, drenched and covered with the vegetable matter of which our ground-work consisted, and which was merely a floating island. Only ankle deep one minute and suddenly immersed to the waist the next, is really no joke, though we thought so much laughter could never before have occurred in the same space of time. The Fijians "clicking" and yelling at their neighbours' alternate misfortunes would surely have amused the most dejected spirit. It was just like going over ever so many deep and narrow ditches, which one could not see. The narrow channels separating the islands had a width of only from 2 to 3 feet, the water was very clear, and we ascertained the depth of the islands below the surface to be about 6 feet. Our friend Clay was again prominent: he had a strong desire to find the depth of water in the channel by being let down, but no one being anxious to drown him, and being in too great a hurry to reach our destination, his whim was not indulged. At last we came upon the scene, and to confess the truth were sadly disappointed. The sheet of water was smaller than we had expected to find it; no birds were to be seen, and a charge of dynamite, expressly brought up, was exploded in the water without any result. A few eels had been seen in the channels between the floating islands, but none sufficiently large to attract much attention. The only other living thing seen was a large scorpion, which had found its way on to Clay's bare feet. The natives had spoken of an outlet from the lake, but we saw no evidence of it, the sheet of water being quite tranquil. Its height above the sea level was ascertained to be about 1600 feet.

With such fine weather our excursion had been one of perfect enjoyment. We returned with a large supply of ferns and mosses, several species of land shells, and amongst the birds were three new species, one being our yellow-breasted friend (*Pachycephala Torquata Layard*). Our lunch, too, was done justice to, and whilst discussing it, we cordially agreed that to enjoy this meal—though it consisted only of sardines, biscuit, and Bass's bottled ale—we knew of no better place in the world than the lake on the heights of Tariuni.

E. A. LIARDET,
Lieut. R.N.

THE VOYAGE OF THE 'CHALLENGER.'

X.

REMARKS ON THE TEMPERATURES OF THE CHINA, SULU, CELEBES, AND BANDA SEAS, BY STAFF COMMANDER T. H. TIZARD.

THE temperatures obtained in the seas partially enclosed by the Indian Archipelago, prove that they have, each of them, deep basins cut off from the general oceanic circulation by ridges connecting the islands which surround them; for although in each sea soundings of over 2000 fathoms were obtained, in no case did the temperature decrease in a regular curve from the surface to the bottom, as is usual in the open ocean; in every case, after attaining a certain depth, the temperature below that depth remained the same: thus, in the Banda and China Seas the temperature remained the same from 900 fathoms to the bottom, in the Celebes Sea from 700 fathoms to the bottom, and in the Sulu Sea from 400 fathoms to the bottom.

In the China Sea three temperature soundings have been obtained, one by Commander Chimmo in H.M.S. 'Nassau,' in lat. 12° 53′ N., long. 110° 31′ E., the depth being 1546 fathoms; and two in the 'Challenger,' one of which is in lat. 17° 54′ N., long. 117° 14′ E., the depth being 2150 fathoms, and the other in lat. 16° 42′ N., long. 119° 22′ E., the depth being 1050 fathoms. In these three soundings the minimum temperature, which varied from 36°·1 to 37°, was found at a depth ranging between 600 and 1050 fathoms. The cause of this difference in the minimum temperature, and the depth at which it was found, I shall endeavour to explain subsequently.

In the Sulu Sea three temperature soundings have been obtained, one in lat. 8° 5′ N., long. 119° 45′ E. of the depth of 1778 fathoms, by Commander Chimmo; one of 2550 fathoms in lat. 8° 32′ N., long. 121° 55′ E.; and one of 2225 fathoms in lat. 8° 0′ N., long. 121° 42′ E. The latter soundings were obtained by the 'Challenger' respectively in October 1874 and in January 1875.

In each of these three soundings the minimum temperature of 50°·5 was reached at the depth of 400 fathoms. From that depth to the bottom the temperature remained unchanged.

In the Celebes Sea three temperature soundings were obtained in the 'Challenger,' one in lat. 2° 55′ N., long. 124° 53′ E., in October 1874, the depth being 2150 fathoms; a second in lat. 5° 44′ N., long. 123° 34′ E., also in October 1874, the depth being 2600 fathoms; and the third in lat. 5° 47′ N., long. 124° 1′ E., in February 1875, the depth being 2050 fathoms. In each of these three soundings the minimum temperature of 38°·5 was reached, at a depth of from 700 to 800 fathoms, from which depth to the bottom the water remained unchanged.

In the Banda Sea three temperature soundings were obtained in September 1874, one in lat. 5° 41′ S., long. 134° 4′ E., the depth being 800 fathoms; a second in lat. 5° 26′ S., long. 133° 19 E., depth 580 fathoms; and the third in lat. 5° 24′ S., long. 130° 37′ E., depth 2800 fathoms.

In the last sounding, 2800 fathoms, the minimum temperature of 37°·5 was reached at the depth of 900 fathoms; from thence to the bottom no alteration in the temperature of the water was detected.

In the Molucca Passage, which connects the Banda Sea with the Pacific Ocean, one temperature sounding of 1200 fathoms was obtained in lat. 0° 41′ N., long. 126 37′ E., in October 1874, and the temperature was found to decrease regularly from the surface to the bottom, the minimum temperature at the bottom being 35°·2.

Two soundings and temperatures were also obtained in January 1875 in the waters of the Philippine Islands, which separates the water of the Sulu Sea from that of the Pacific Ocean. One of these soundings (700 fathoms) is in lat. 12° 21′ N., long. 122° 15′ E., in the basin formed by the islands of Panay, Tablas, Romblon, Sibuyan, and Masbate; and the other (375 fathoms) in lat. 9° 26′ N., long. 123° 45′ E., south of Bohol Island, in the channel leading from Suriago Strait to the Sulu Sea. In the first sounding the minimum temperature of 51°·5 was reached at the depth of 220 fathoms; and in the second, the minimum temperature of 54° was reached at the depth of 230 fathoms.

A temperature sounding of 2550 fathoms was obtained, in February 1875, in lat. 4° 19′ N., long. 130° 15 E., in that part of the Pacific Ocean adjacent to the Celebes Sea and Molucca Passage. Here a minimum temperature of 34°·6 was reached at 1300 fathoms.

An examination of the chart of these regions will show that the deep basins of the China and Celebes Seas are alone in communication with the Pacific Ocean, and that consequently their temperature must be greatly dependent on the temperature of that part of the Pacific immediately adjacent to their openings into that ocean, for although both seas are in communication indirectly with the Indian Ocean, they are cut off from the deep basin of that ocean by a large tract of shallow water, which, in the China Sea, exceeds a breadth of 600 miles, and in the Celebes Sea is apparently about half the length of the Macassar Strait.

The Sulu Sea receives its waters from the China and Celebes Seas and Pacific Ocean; its temperature depends, therefore, to a great extent on the temperatures of those seas, and must be considered with reference to them.

The Banda Sea communicates freely both with the Arafura Sea and the Pacific Ocean, and consequently its temperature must be considered in connection with the temperature of their waters. Unfortunately, we have at present no serial temperature sounding in the Arafura Sea, and are, therefore, compelled to limit the comparison, for the present, with the temperature of the Pacific,

The Temperature of the Sulu Sea.

The mean latitude of this sea is 8° N., and it has a higher minimum temperature than either of the seas in communication with it.

This minimum temperature, viz. 50°·5, is invariably reached at a depth of 400 fathoms. In the China Sea this temperature is found at a depth of 200 fathoms, in the Celebes Sea at 180 fathoms, and in the Pacific at a depth of 230 fathoms.

It may therefore be inferred that the Sulu Sea is prevented from freely interchanging its waters with those of the China Sea by a ridge joining Borneo, Palawan, and the Philippine Islands, which does not exceed 200 fathoms in depth; that the ridge which joins the coast of Borneo with the Sulu Islands and Mindanao, does not exceed 180 fathoms in depth; and, lastly, that the ridge which separates the Sulu Sea from the Pacific Ocean does not exceed 230 fathoms in depth; for were there any deeper passages into the Sulu Basin, the colder water of the surrounding seas would certainly be forced into it, as the specific gravity of its water is lighter than that of the China and Celebes Seas at the same temperature, and therefore considerably lighter at a higher temperature.

A reference to the chart of the Sulu Archipelago proves this inference to be correct in one case, as a ridge of less than 100 fathoms in depth extends from Mindanao Island along the northern sides of the Sulu Archipelago to Pangutarang Island, from there the 100 fathoms line takes a bend in towards Sulu Island, and, after running to the south-westward a short distance from that island, turns again round the Ubian group, from whence it apparently runs pretty straight to the island of Doecan. Between this island and the Pearl Bank is a deep channel 5 miles in width, the exact depth of which is not known, but probably soundings of less than 180 fathoms would be found joining this bank with Doecan Island, a little north or south of the narrow part of the channel, even should there prove to be deeper water in the channel itself. From the Pearl Bank to the east point of Borneo is a ridge of 80 to 150 fathoms in depth.

The depth of the greater part of the ridge joining the islands which separate the China and Sulu Seas is also known to be shallow, viz. from Sandpanmangio Point in Borneo to Busuanga Island, at the north-east extreme of Palawan Island. The depth of Mindoro Strait, which separates the islands of Busuanga and Mindoro, has not yet been ascertained, but from the numerous shoals adjacent to and in these straits it is improbable that the water is very deep.

As both of the temperature soundings obtained in the straits which divide the Philippine Islands (through which straits all water must pass from the Pacific Ocean to the Sulu Sea) showed a higher minimum temperature closer to the surface than the Sulu Sea, it is evident that none of the water in the deep basin of that sea can come directly from the Pacific, but only indirectly through the Celebes and China Seas.

The temperature of the upper portion of the water of the Sulu Sea, from the surface to 400 fathoms, agrees fairly well in all three soundings, although taken at different seasons of the year; and probably there is never much alteration. The isotherm of 80° was found at 20 fathoms from the surface, that of 75° at 40 fathoms, that of 70° at 65 fathoms, and that of 65° at 90 fathoms from the surface: the isotherms of 60° and 55° do not agree quite so well as the others. In Commander Chimmo's sounding they are at 150 and 220 fathoms from the surface, whilst in the two soundings of the 'Challenger' they are at 120 and 180 fathoms.

The Temperature of the Celebes Sea.

The mean latitude of this sea is 3° N., and the mean latitude of its opening into the Pacific between the north-east point of Celebes and the south point of Mindanao is 3° 40′ N., or nearly the same, and as we have obtained a temperature sounding close to the northward of this parallel in the Pacific Ocean, about 300 miles to the eastward of the Talautse Islands (the chain extending from the north-east point of Celebes to the south point of Mindanao), we are able to make a good comparison between the temperature of the Celebes Sea and that part of the Pacific Ocean adjacent to it.

As has been before stated the minimum temperature of this sea is 38°·5, and the depth at which it was found varied from 700 to 800 fathoms.

The isotherm of 38°·5 is at a depth of 650 fathoms both in the Pacific Ocean and Molucca Passage, in positions immediately outside the channels which connect the Celebes Sea with their waters, and below that depth their temperatures still decrease. It is therefore probable that there is a ridge of not more than 650 fathoms in depth, running from the north-east point of Celebes Island through the Talautse group to the south point of Mindanao, which prevents the colder water of the Pacific penetrating into the deep basin of the Celebes Sea.

The temperature of the upper portion of this sea from the surface to the depth of minimum temperature would appear to be constant, as nearly the same results were obtained in our three soundings, although taken at different times of the year. From the surface to 300 fathoms in depth they agreed with great exactness, the isotherm of 80° being at 40 fathoms, that of 75° in 70 fathoms, of 70° in 75 fathoms, of 65° at 100 fathoms, of 60° at 120 fathoms, of 55° at 140 fathoms, of 50° at 190 fathoms, and of 45° at 300 fathoms. From the depth of 300 fathoms to that of minimum temperature, between 700 and 800 fathoms, the isotherm did not agree so well; but this, I think, may be readily accounted for, as the sounding of 2150 fathoms, which gives the minimum temperature at 700 fathoms, or 100 fathoms less depth than the other, was taken nearest the ridge which separates the Celebes Sea from the Pacific Ocean, and would, therefore, keep nearer the temperature of the same depth in that ocean than the water at a greater distance from the ridge.

The Temperature of the Banda Sea.

Of the three temperature soundings obtained in this sea, only one was of sufficient depth to enable us to ascertain that it also had an enclosed basin, viz., the sounding of 2800 fathoms. The minimum temperature of this sounding was 37°·5, which was found at a depth of 900 fathoms. The isotherm of 37°·5 is at a depth of 750 fathoms in the Molucca Passage and the Pacific Ocean, and it may therefore be assumed that the depth of the ridge separating the basin of the Banda Sea from the Pacific does not exceed that depth. This sea is, however, as has been

before noticed, also in free communication with the Arafura Sea, but we have no temperature soundings there to compare with our observations in the Banda Sea, and consequently are unable to determine approximately the depth of the dividing ridge. By the soundings shown on the charts of the Indian Archipelago, it would appear that it does not exceed 800 or 900 fathoms in depth.

Although only one complete temperature sounding below the depth of minimum temperature was obtained in the Banda Sea, this minimum temperature was confirmed by a sounding of 1425 fathoms, west of the Banda Islands, where the thermometer attached to the line just above the sounding-rod showed the minimum temperature to be 37°·5, or the same as that obtained by the 2800 fathoms sounding.

The temperature of the water from the surface to 900 fathoms, or the depth of minimum temperature, appears to be constant, as it is in the Celebes Sea, all these results agreeing remarkably well.

The isotherm of 80° was here found at the depth of 22 fathoms, that of 75° at 50 fathoms, of 70° at 80 fathoms, of 65° at 100 fathoms, of 60° at 130 fathoms, of 55° at 165 fathoms, of 50° at 200 fathoms, of 45° at 330 fathoms, and of 40° at 600 fathoms.

The following table exhibits the depth at which the various isotherms will be found in the Sulu, Celebes, and Banda Seas:—

Isotherm.	Depth in Sulu Sea. Fathoms.	Depth in Celebes Sea. Fathoms.	Depth in Banda Sea. Fathoms.
°			
80	20	40	22
75	40	70	50
70	65	75	80
65	90	100	100
60	120	120	130
55	180	140	165
50	Below min. temp.	190	200
45	—	300	330
40	—	580	600

The specific gravity of the water in the Celebes, Sulu, and Banda Seas was found to be less than in the Pacific Ocean on the surface; this may be accounted for by the excess of rainfall over evaporation in the area occupied by them.

The Temperature of the China Sea.

The results of the temperature soundings obtained in this sea appear at first somewhat perplexing, as in the sounding of 1546 fathoms off the coast of Cochin China the minimum temperature (37°) is nearer the surface than it is in the sounding of 2100 fathoms in the middle of the sea, although the surface temperature was 9° higher; and the minimum temperature of the 2100 fathoms sounding (36°·1) is again nearer the surface than that of the 1050 fathoms sounding (36°·5) close to the coast of Luzon.

The temperature of the surface-water (84°) of the sounding off the Cochin China coast shows that it was taken in the summer, or during the prevalence of the south-west monsoon, whilst the 'Challenger's' soundings were taken in the winter during the north-east monsoon. This is sufficient to account for the differences of temperature exhibited close to the surface, especially if we consider that at about th e depth of 100 fathoms the temperature of 60° is comm on to all three positions, the temperature of 84° at the surface being also found at one season of the year all over the China Sea, and that probably 100 fathoms is the depth to which the water is influenced by the difference in the heat imparted by the sun during summer and winter, the temperature below that depth being due to circulation.

As has been before noticed, the temperatures of the Banda, Celebes, and Sulu Seas appear to be nearly constant, the same results having been obtained in them irrespective of season and locality. In the China Sea this is not the case; there the results obtained in different localities differ greatly, but it must be borne in mind that the China Sea, which differs from the other seas enclosed by the Indian Archipelago in this respect, differs also in some other important particulars. Neither of those three seas have a large extent of shallow water, whereas nearly one half of the area of the China Sea is under 100 fathoms in depth. Again, in each of those seas, the mean latitude of the outlet into the ocean is nearly the same as the mean latitude of the sea itself, consequently the water which they derive from the ocean is subject to the same, or nearly the same, conditions in their basins as it is in that part of the ocean which supplies them. In the China Sea this is very different, as although its mean latitude is 11° N., the mean latitude of its outlet into the Pacific Ocean between the north point of Luzon and Formosa is 20½° N., and the mean latitude of the shallow water, which always has a high temperature, and which extends all over its south-western part westward of the meridian of 109° E., is 5° N.; and furthermore, the China Sea has, in the winter, a large range of surface temperature from 64° at Hongkong, to 84° at Singapore, whilst the surface temperature of the other three seas varies only slightly all the year round.

The change of the seasons also greatly affects the temperature of the China Sea, for whilst during the north-east monsoon, more particularly from the end of the year to the end of April, the evaporation is greater than the rainfall, during the remainder of the year the rainfall is greatest, as will be seen from the observations taken at Manila. The total evaporation for the year at Manila was, in 1870, 23·7 inches greater than the rainfall, but in the first four months of that year it was 28 inches greater than the rainfall during those months, showing that there must have been an excess of 4 inches of rain over evaporation during the remaining eight months. In 1871 the total evaporation was 32·5 inches greater than the rainfall, and in the first four months of that year 45 inches greater, leaving 12·5 inches of rain in excess of evaporation for the remainder of the year. The mean average rainfall at Manila is 95·36 inches.

This excess of evaporation over rainfall in the early part of the year during the prevalence of the north-east monsoon must also take place at Labuan and Hongkong, as although the average total rainfall at Labuan is 115 inches per annum, only an average of 22 inches falls during the first four months of the year; and at Hongkong, where the average total rainfall per annum is 80·14 inches, 7·77 inches only fall at this period. In fact, at this port, from the end of October to the end of April, the average rainfall is only 8·68 inches. The evaporation at these ports at different seasons of the year has not yet been ascertained, nor have we the Meteorological Register of

Singapore on board, so that I am unable to state exactly what takes place in the extreme south part of the sea, but I am, I think, justified in assuming, looking to the small quantity of rain that falls in the first four months of the year in proportion to the total fall, that all over the China Sea the evaporation is in excess of the rainfall during the north-east monsoon, and that the rainfall is in excess of the evaporation during the south-west monsoon.

The direction of the wind also assists in causing differences of temperature in the China Sea at different seasons of the year, for whilst during the north-east monsoon the surface water is forced by the wind into the China Sea from a higher and colder latitude than the mean latitude of this sea, in the south-west monsoon the surface water is forced out by the wind.

It will be seen, therefore, that during the prevalence of the north-east monsoon, water has to be drawn into the China Sea from the surface to replace the amount drawn off from an excess of evaporation over rainfall, and that this movement of the water is greatly accelerated by the strong north-east wind that prevails at the same time; so much so, in fact, that more water is forced into the sea than is necessary, as is proved by the almost constant outflow in this monsoon through the narrow straits communicating with the Java Sea and Indian Ocean; that in consequence of the excess of evaporation over the rainfall, the surface water, more particularly in the south-west part of the sea, becomes heavier and has a tendency to sink, and in sinking it carries with it its high temperature, which it imparts gradually to the deeper water of the sea.

In the south-west monsoon the excess of rainfall over evaporation has a tendency to force out the surface water from the sea into the ocean, and this movement is also greatly accelerated by the monsoon which forces more out than is necessary, as the north-east monsoon forces more in than is requisite.

The consequence of this is, that in the north-east monsoon the water in the China Sea will have a tendency to sink and *flow out* at the bottom into the Pacific Ocean, whilst in the south-west monsoon it will *flow in* and rise to the surface, so that the minimum temperature of the sea during the south-west monsoon will be nearer the surface than it is in the north-east monsoon.

Under these circumstances, although it is evident that the China Sea is cut off from the general circulation of the Pacific (its minimum temperature of 36°·1 being at a depth of about 900 fathoms in that ocean), it is not possible to form a good estimate of the depth of the ridge which separates it from the Pacific, but it probably is between the depth of 700 and 1000 fathoms.

The differences in the minimum temperature itself obtained by Commander Chimmo from that obtained in the 'Challenger' is probably due to his not knowing the errors of his thermometers for pressure. The average errors of our thermometers for 600 fathoms (the depth at which he obtained his minimum temperature) is −·4°, which deducted from his minimum temperature of 37° would make it 36°·6, or nearly the same as we obtained in the 'Challenger.'

A temperature sounding obtained in the North Pacific Ocean in lat. 22° 1′ N. was annexed to the diagram in the report for the purpose of comparison with the temperature of the China Sea, as that is nearly the mean latitude of the outlet of this sea into the Pacific, but its distance from the outlet (1000 miles) renders it of much less value than it would be if taken in the vicinity of the Bashee Islands. It shows, however, that the isotherm of 40°, as well as that of 36°, is very nearly at the same depth in the centre of the China Sea as it is in the Pacific Ocean in the lat. of 22° N. (the mean latitude of the outlet of the China Sea into that ocean). Above the isotherm of 40° the temperature of the sounding in the centre of the China Sea coincides more nearly with the temperature of the Pacific Ocean in the same latitude (17½° N.).

On the Temperatures of the North Pacific Ocean.

Since leaving Samboangan, nineteen soundings and serial temperatures have been obtained in the western part of the North Pacific Ocean, in two sections, one from the Meangis Islands to the Admiralty Islands, and the other from the Admiralty Islands to Japan. On each occasion the temperature was obtained at every 100 fathoms from the surface to 1500 fathoms, or where the depth was less than 1500 fathoms from the surface to the bottom, and in nine cases the temperature was obtained at every 10 fathoms from the surface to a depth of 200 fathoms.

We found that when the depth exceeded 1500 fathoms the thermometers which registered the bottom temperature gave the same result, viz. 34°·4, as they did at 1400 fathoms.

The same peculiarity was noticed in the temperatures obtained between the Fiji Islands and Australia, the bottom temperatures there being the same as at 1300 fathoms. At a little to the southward of Tongatabu the bottom temperature was 32°·9; and as the United States officers appear to have obtained colder temperatures at the bottom, between America and Japan, than any yet obtained by us in the North Pacific Ocean, it is probable that the bed of the Pacific is divided into at least three deep basins by ridges of a not greater depth than 1400 fathoms from the surface. Further investigation is, however, requisite before this can be satisfactorily decided.

Although the temperatures were obtained in the winter months of February and March, the temperature of the surface water in the southern part of the western portion of the North Pacific Ocean was found to be considerably higher than any we have yet registered in the open ocean.

In the Atlantic Ocean our highest surface temperature was 79°·5, and in the South Pacific 80°, whereas in the North Pacific, from the Meangis Islands to the meridian of 148° E. (which is our farthest east point), and from the parallels of 2° S. to 11° N., the surface temperature varied from 80° to 84°, and the isotherm of 80° was found to be at an average depth of 75 fathoms from the surface between the parallels of 2° 33′ S. and 5° 30′ N.; below that depth the temperature decreased rapidly, in one instance as much as 21° in 20 fathoms.

As it is probable that our section from Honolulu to Tahiti will enable us to form a better judgment as to the causes which produce this banking up of warm water in the Pacific Ocean, as well as to the peculiarity in the bottom temperatures, it would be premature on our part attempting to account for them at present.

Reviews.

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THE NATIVE RACES OF THE PACIFIC STATES.*

ALTHOUGH much has been written upon the American races, many students have devoted years to the study of their languages and history, and a vast amount of material has been laboriously collected, no satisfactory general work has yet been produced on any one of them, and not one of the many deeply interesting problems that await solution, in connection with American antiquities and ethnology, have yet been mastered.

One reason for this is, that of the few who have really devoted years of honest study to this field of research, there is scarcely one who has not commenced with some foregone conclusion, and has laboured, not from the love of truth, but to prove some more or less absurd theory respecting the origin of the American civilizations. Thus Montesinos approached the subject with ideas touching King Solomon and Mount Ophir; Ranking with his Mongol Princes and elephants; Lord Kingsborough had his head full of Jews; Brasseur de Bourbourg indulged in still wilder speculations, and Dr. Lopez has recently bestowed much erudition on his "Races Aryennes du Perou."

It is with sincere pleasure that we welcome a great work on the American races, full of suggestive materials, and with the evidence of careful original research, yet with no foregone conclusion and no theory. Mr. Hubert H. Bancroft has, in his five volumes, most ably condensed an amount of knowledge which it would take years of study to acquire from any other source. Always giving the views of former writers on every important point, he preserves his own judgment unclouded by theories and unbiassed by prejudice; and he arrives at the same provisional conclusions as have been reached by others who have approached this interesting subject in the same spirit.

Mr. Bancroft's first volume is devoted to the western Eskimo, and to the more or less uncivilized tribes in the far north; and the four other volumes treat of the myths and languages, the antiquities and the primitive history of the civilized nations of Mexico and Central America. The native civilization north of the Darien isthmus is conveniently divided into two branches, the ancient *Maya*, and the more recent *Nahua*. These two stocks show such clear points of difference standing out prominently from their many resemblances, as to indicate either a separate culture from the first, or, what is for us practically the same thing, a progress in different paths for a long time before the coming of Europeans.

The Maya civilization flourished some centuries—perhaps many centuries—before the discovery of America, in the region now covered by the dense forests of Chiapas, Guatemala, Yucatan, and Honduras, where extensive and magnificent ruins of ancient cities have been discovered. These cities were abandoned and more or less unknown at the time of the conquest, and the descendants of the Maya race were represented by the Quichés of Guatemala, and the other tribes of Central America. The Nahua civilization was that of the Toltecs and Aztecs of the Mexican table-land. Mr. Bancroft's account of Nahua civilization is complete and exhaustive, and the text is supported by numerous references to original authorities; an immense advantage to those students who wish to investigate any branch of the subject more closely. To such enquirers Mr. Bancroft's work is invaluable.

Two of the most interesting chapters in the work are those on the Aztec picture-writing and the Maya hieroglyphics. In the former, after touching upon the destruction of the native archives at Mexico by the fanatic Zumárraga, there is an account of all the picture documents that have been preserved, with a description of the system according to which they were painted. In the latter we are given an admirably condensed account of the few Maya manuscripts that have been preserved, with plates from the sculptured stone tablets, of Bishop Landa's alphabet, and of the attempted interpretations of the Maya writings by Brasseur de Bourbourg and others.

The study of American languages can scarcely fail to receive a fresh impetus from the publication of Mr. Bancroft's work. For he clearly shows that the more they are studied, the more do new beauties appear; and that language is the surest test of the age of a people, and of their progress. He also does good service by holding up to deserved ridicule the host of shallow theorists who have so encumbered the subject with their ponderously erudite absurdities. Najera tells us that the Otomi is Chinese, because both languages are monosyllabic; Lopez publishes a large volume to show that Quichua is an Aryan language; and Brasseur de Bourbourg wastes reams of paper to prove that Maya is the primeval language from which Latin, Greek, German, and English were derived. No doubt, with a little trouble and some turning and twisting, similarities in some few words might be shown between any two languages in the world.

As the Quichua is the richest and most copious of the South American languages, so the Aztec is the most perfect and finished to the north of the isthmus. It is full and rich, having words for 2200 different kinds of Mexican plants, and for 200 or more species of birds. The missionaries found it admirable for their purpose, as in it, and without the aid of foreign words, they could express all the shades of their dogmas; and the many written Aztec sermons and rituals attest the copiousness of the tongue. The Otomi language, which next to the Aztec is the most widely extended in Mexico, was spoken by people in the mountains encircling the valley of Anahuac, and throughout Queretero and Guanajuato. It claims attention as the only true monosyllabic language found in America. Mr. Bancroft passes in review the myths and legends, and the languages of the Pacific States, and thus concludes his third volume:—

"He who carefully examines the myths and languages of the aboriginal nations inhabiting the Pacific States, cannot fail to be impressed with the similarity between them and the beliefs and tongues of mankind elsewhere. Here is the same insatiate thirst to know the unknowable, here are the same audacious attempts to tear asunder the veil, the same fashioning and peopling of worlds, laying out and circumscribing of celestial regions, and setting up spiritually and materially of creators, everywhere manifest. Here is apparent what would seem to be the same inherent necessity for worship, for propitiation, for purification, for atonement and sacrifice, with all the symbols

* *The Native Races of the Pacific States of North America.* By Hubert Howe Bancroft. 5 vols. (Longman, 1875.)

of natural and artificial religion. In their speech the same grammatical constructions are seen, with the usual variations in form and scope, poverty and richness, which are found in nations, rude or cultivated, everywhere. Little as we know of the beginning or end of things, we can but feel, as fresh facts are brought to light, and new comparisons made between the races and ages of the earth, that humanity, of whatever origin it may be, or howsoever circumstanced, is formed on one model, and unfolds under the influence of one inspiration."

In his fourth volume Mr. Bancroft gives the best general description that has yet appeared of the antiquities of the Maya and Nahua regions, from the cemeteries of Chiriqui to the monuments of the Gila valley.

The treatise contained in the fourth volume is, undoubtedly, the most complete ever published on American antiquities as a whole, for it combines a detailed description of the magnificent ruins described by Stephens, and of the remains in Nicaragua treated of by Squier, with a full account of the ruins discovered in the Northern Mexican States, in Arizona and New Mexico. Chapters are also devoted to briefer reviews of the works of the mound-builders, and of Peruvian antiquities. We have only space to refer to the Yucatan region, a portion of which was examined by Stephens and Catherwood, and yielded a rich antiquarian harvest. But a very large part of Yucatan still remains untrodden by the antiquary's foot, especially in the east and south. It can hardly be doubted that extensive ruins lie hidden in these unexplored regions. Mr. Bancroft's method is fully to describe the most important remains, and then to point out contrasts in the rest; thus avoiding a tiresome monotony in attempting to make known some hundreds of structures which resemble each other in most of their details, as well as in their general features.

In his final volume our author treats of the primitive history of the Aztecs and Mayas, before the discovery of America. It is well known that early Spanish chronicles require to be read with much care and no little suspicion, owing to the theories and foregone conclusions with which their authors are invariably hampered, and to their uncritical methods both of collecting and conveying information. Still many of them, when properly used, are extremely valuable. But both Peru and Mexico had the advantage of having native historians, descended from their ancient dynasties, to record their past glories, in the language of their conquerors. In spite of the detraction of ignorant pretenders to antiquarian knowledge, the Ynca Garcilasso de la Vega will always retain his place as the best authority on early Peruvian history. The Garcilasso of Mexico was Fernando d'Alva Ixtlilxochitl, a descendant of the kings of Tezcuco, who wrote at the request of the Spanish Viceroy. We also have an authentic narrative of the myths of the old Maya civilization in the *Popul-vuh*. Mr. Bancroft has made good use of all available authorities in order to give a comprehensive history of the Toltec, Chichimec, and Aztec periods in Mexico; of the Quiché empire in Guatemala, and of the Mayas in Yucatan.

A tolerably complete knowledge of the literature of American antiquities enables us to pronounce, with confidence, that Mr. Bancroft has performed his task with conscientious thoroughness. At the same time his vast subject is very ably handled, and the information he conveys is often admirably condensed. *The Native Races of the Pacific States* deserves to take its place as a classic work, and to be generally read; while it will continue to be an indispensable book of reference to students of the ancient American civilizations.

ANGOLA AND THE RIVER CONGO.*

THIS description of the Portuguese possessions on the west coast of Africa is based upon the experience gained during many years' residence and travel. The author has aimed at presenting us with a truthful account of the country, its productions and inhabitants. After an historical introduction and a concise notice of the broad physical features, he takes us from district to district, beginning with the Congo, on the north, and ending with Mossamedes in the south. His book is not a dry statistical record, abounding in figures and tables, and entering into endless details of interest only to a few, but a smartly written account of personal adventure, a description of manners and customs rendered familiar and intelligible from many years' intercourse with the natives, and of outspoken comments upon certain social and political conditions. Slavery, the capacity of the negro for civilization, missionary efforts, and the government, or rather misgovernment, of the Portuguese are dealt with prominently, and though we may not agree with our author in every instance—indeed, the evidence he produces himself is sometimes very conflicting—we yet feel that his opinions are deserving of attention, as those of one who possessed unusual opportunities for observation.

Slavery in Angola he describes as a domestic institution, attended by very little cruelty, and a stranger, we are told, would frequently be unable to distinguish between the master and his slaves. He certainly does not wish to revive the slave trade, but advocates a scheme of emigration under government supervision. The majority of the slaves exported formerly, he tells us, were negroes condemned to slavery or death, in accordance with native laws, and their export therefore amounted virtually to the commutation of a sentence of death into banishment. An awful amount of bloodshed now going on could be stopped by the introduction of such an emigration scheme. Yet what are these emigration schemes but a slave trade in disguise, especially when the emigrant is to be obtained from the same sources of supply which of yore furnished the slave. Even our author admits that trade and industry have become much developed along the Congo coast since the abolition of that traffic, and Loanda, from being a dilapidated place, has grown into the finest town on the whole west coast of Africa. The proposed liberation of the slaves, however, which is to take place in 1878, is said to threaten the present state of prosperity with ruin.

The negro cannot count our author amongst his admirers. The negro character, we are told, is distinguished "by the absence of good qualities, and of feelings and emotions that we can hardly understand or realize to be wanting in human nature . . .

* *Angola and the River Congo*, by J. J. Monteiro. London (Macmillan & Co.), 1875.

"He knows no love, affection or jealousy,"—"has no words or expression in his language expressive of affection or love," and no "idea of mercy, pity, or compassion for suffering." All efforts to civilize the negro by purely missionary efforts, he tells us, have hitherto proved signal failures, and ought to be combined with industrial training. Yet, how are we to reconcile the following passage with such sweeping assertions:—

"It is impossible for anyone who has lived much amongst natives of tropical climates not to contrast the life led by them with that endured by a great portion of our own so highly civilized race—to compare their, as a rule, harmless, peaceful, healthy, and I may say sinless existence, with the grinding, despairing poverty of our cities; with the awful misery that hides in noisome dens under a cruel and rigorous climate, without warmth, air, water or food . . . . . We spend large sums in the fruitless attempt to reclaim and convert the negro from his so-called dark state, and we allow thousands of our innocent children at home to grow up as thieves and worse than savages."

We fancy in this paragraph our author runs into extremes in opposite directions. We are willing to take all his facts, but he must permit us to draw our own conclusions from them. As to the great value of his book there will hardly be two opinions, and we can honestly recommend it to those in search of a few hours' pleasant reading, as well as to geographical students.

LEUPE ON NEW GUINEA.*

THE geographers of most civilized countries are concentrating their attention on the vast and still mysterious island of New Guinea. Its interior is unexplored, even its coasts, although partially known for upwards of three centuries, are not yet completely examined; but Englishmen, Dutchmen, Italians, Germans, and Russians are combining to open the Papuan secrets to the world. The time is, therefore, specially opportune for taking stock of all existing knowledge, and we heartily welcome the appearance of Major Leupe's valuable work on the voyages of Netherlanders to New Guinea and the Papuan Islands in the 17th and 18th centuries.

The great island was, we believe, discovered by the Portuguese Governor Jorge de Meneses, in 1526, when on a voyage from Malacca to the Moluccas, during which he was driven far to the east, and wintered in a port on the north coast of Papua. The name is said by some to have been given by the people of Moluccas on account of the woolly hair of the islanders, but Galvano says that Papua means black. There was deadly feud between Spaniards and Portuguese, who in working round the world in opposite directions had encountered each other among the Spice Islands, and formed two hostile factions. The chiefs of Terrenate adhered to the Portuguese, while those of Gilolo and Tidore ranged themselves on the side of the Spaniards. In 1527 Hernan Cortes fitted out an expedition which sailed from the west coast of Mexico under Alvaro de Saavedra, and reached the Spice Islands. On their return, in 1528, these Spaniards coasted along the north coast of New Guinea for the space of a month. Fourteen years later, in 1542, Ruy Lopez de Villalobos led another expedition from the coast of Mexico, and reached Gilolo in 1544. Villalobos died at Amboyna in 1547, after having succumbed to Portuguese influence; but another Spanish captain named Yñigo Ortiz de Retes, in the good ship 'San Juan,' continued to explore. He sailed along the north coast of Papua, anchoring in several ports, in 1546, and he it was, we think, who first gave the land the name of New Guinea, from the resemblance of the natives to the people on the west coast of Africa. The next Spanish voyager was Luis Vaez de Torres who, after his separation from Quiros at Espiritu Santo, one of the New Hebrides, came to New Guinea, and sailed along the southern coast, in 1606, taking possession in the name of the king of Spain; and, passing through the strait which bears his name, he reached Manilla in 1607.

Torres in his *Relacion*, which was first printed by Captain Burney, and afterwards by Mr. Major in his *Early Voyages to Australia* in 1859, mentions the Dutch ships among the Spice Islands; and at this time the Spanish discoveries cease, and the enterprises which form the subject of Major Leupe's work commence.

Hitherto the published information respecting early Dutch voyages to New Guinea has been very meagre. There are notices in M. Thevenot, Witsen, Valentyn, and Struyk; and there is an enumeration of some of them in the instructions drawn up for Tasman in 1644, and signed by the Governor-General Van Diemen—an interesting document, which was first published by Dalrymple, and again by Mr. Major. But the present work of Leupe contains far more complete information. It consequently supersedes all that has gone before it, and takes its position as the standard book on Dutch voyages to New Guinea.

Torres completed his voyage in 1607. The first Dutch expedition was contemporaneous. It is mentioned by Purchas in the account of the voyage of Saris, and also in the Instructions to Tasman, but Leupe gives a much fuller notice. The vessel employed was the 'Duyfke,' (or 'Duyfhen'?), under the command of William Jansz, who sailed in her from Bantam in 1606, visited the Arru and Ki Islands, sailed along the west and south coasts of New Guinea, and through Torres Strait to the Gulf of Carpentaria, and discovered many islands. Jansz was followed by Cornelis Dedal in 1616, Jan Vos in 1622, and Jan Cartensz in 1623. At this time, also, the daring voyage round the world of the gallant interlopers Le Maire and Schouten was performed. They sailed along the north coast of New Guinea in 1617, and discovered the Schouten Islands at the entrance of Geelvink Bay.

In 1636 an expedition started from Banda under Gerrert Thomaz Pool, and Pieter Pietersz. Pool was murdered by the natives of Ceram Laut, but Pietersz continued the voyage, brought back much valuable information respecting the Arru group, and discovered Timor and the Teminber Islands.

The next expedition was undertaken, in 1642, by those renowned navigators Abel Jansz Tasman and Franchoys Jacobsz Visscher, under instructions from the enterprising Governor-General Van Diemen. We have already noticed the former work of Major Leupe

* *De Reizen der Nederlanders naar Nieuw-Guinea en de Papoesche Eilanden in de 17de en 18de eeuw.* Door P. A. Leupe. ('S Gravenhage Martinus Nijhoff, 1875.)

(see *Ocean Highways* for January 1873, p. 317), in which he gave a biographical sketch of Visscher, and a critical notice of the manuscripts of Tasman's voyage. In the present volume he briefly touches upon the two voyages of Tasman in 1642 and 1644; and passes on to the expeditions of Adriaen Dortsman in 1645, who did not reach New Guinea, and of Gommersdorf and Braconier in 1654. In the following twenty years there were five expeditions to New Guinea or the Papuan Islands. In 1655 Jacob Borné made three voyages, and was eventually murdered at Goram with most of his men. In 1662 William Buys made an unsuccessful voyage to Goram, and Nicolaes Vinck was the first to describe the deep bay afterwards explored and laid down by Lieutenant MacCluer.

But a much more important expedition was undertaken in 1678, when Johannes Keyts sailed to New Guinea in a vessel called the 'Saxenburg,' and explored several bays, and the mouths of numerous rivers. He kept a full journal, which is now published for the first time. On his return, in 1679, Augustijn Dirckz was sent in search of four islands said to be surrounded by pearl banks, to the south of the Arru group, but he returned unsuccessful.

Next, in point of time, comes an undertaking which of course does not find a place in Major Leupe's list. In 1699 King William III. sent Captain Dampier on a voyage which had for its sole object geographical discovery. Dampier sighted the land of New Guinea on New Year's Day of 1700, in an unseaworthy old tub called the 'Roebuck.' He sailed along the north coast, and to him belongs the honour of having discovered the strait which bears his name, dividing New Guinea from New Britain.

Leupe passes on to the year 1705, when his countryman Jacob Weyland, in command of two vessels called the 'Geelvink' (or "Green Finch") and 'Kraan Vogel' ("Crane") was sent with orders to proceed to Schouten Island, and thence make a careful survey of the north coast of New Guinea. Weyland was the discoverer of the deep indentation which he explored and mapped, giving it the name of Geelvink Bay, after his own ship. He did much useful geographical work, and brought back a goodly stock of information.

The Dutch East India Company was very jealous of interlopers, even among their own countrymen. In 1616 they seized the ships of the circumnavigators Schouten and Le Maire; and in 1722, when another bold voyager, Jacob Roggeveen, arrived at Batavia, after having crossed the Pacific and coasted the north side of New Guinea, he received similar treatment.

Lieutenant MacCluer, in 1791, first mapped the bay which bears his name, but which was discovered by Vinck in 1662. MacCluer's work, combined with that of Weyland in Geelvink Bay, established the correct shape of the great north-western peninsula of New Guinea; and some further useful surveying was executed by Lieutenant Kolff of the Dutch Navy, while in command of the brig 'Dourga,' in 1825 and 1826. That officer's interesting narrative was published in 1838, and Mr. Windsor Earl brought out an English translation in 1840. Kolff's expedition was followed, in 1827, by the formation of a Dutch settlement and the erection of a fort in Triton's Bay on the west coast.

A translation of Major Leupe's volume would be useful at a time when the exploration of New Guinea is attracting so much attention both in England and in the Australian Colonies. The geographical information it contains is obtained from the *Oud Kolonial Archief der Oost Indisch Compagnie*, and most of it has never before been published. The volume, which contains 295 octavo pages, and is illustrated by three maps, is thus a most valuable contribution to geographical knowledge.

THE MAMMALS AND BIRDS OF BURMAH.*

THERE can be no question of the great influence exercised upon the study of Indian natural history by the publication of Dr. Jerdon's well-known handbooks, and it is much to be regretted that no successor has been found to continue the good work which he commenced. As regards the zoology of the Peninsula of India from Cape Comorin up to the summit of the Himalayas, they are replete with information of every kind, both for the cabinet student and for the collector in the field. The enormous advance that has recently been made towards the acquisition of a more perfect knowledge of the Indian *fauna* is no doubt mainly due to the excellent basis for observations laid down in Dr. Jerdon's volumes. Dr. Jerdon, however, did not include the British provinces on the east of the Bay of Bengal within the scope of his work, and a knowledge of the zoology of this extensive district could hitherto only be obtained by the study of various papers and memoirs scattered throughout many different periodicals. When Sir Arthur Phayre, lately Chief Commissioner of the Burmese Provinces, was preparing his work upon that country, he requested the late Mr. Blyth to write him a chapter on the zoology of Burma. Mr. Blyth, who, as is well-known, was perhaps better acquainted with the zoology of every part of our Indian dominions than any man then living, took up the subject with his usual ardour, and devoted the greater part of the last three years of his life, broken up as they were by frequent attacks of illness, to the accomplishment of a memoir on the mammals and birds of Burmah. But Mr. Blyth's memoir, which was left incomplete at his death, was found to be much too bulky for Sir A. Phayre's work. At the same time, as treating of a subject yet unworked, it was thought to be too valuable to be neglected, and his friends determined to publish it in the *Journal of the Asiatic Society of Bengal*, in an extra number, as a memorial of the deceased naturalist. Such was the origin of the work now before us, which contains articles on the mammals and birds of the Burmese Provinces, prefaced by a biographical memoir of the author. The MS. having been left incomplete, the article on the mammals has been revised and prepared for the press by Dr. John Anderson, Director of the Indian Museum at Calcutta, and Mr. Dobson; that on the birds by Viscount Walden, one of our best authorities on Oriental ornithology. The obituary notice of Mr. Blyth has been written by Mr. A. Grote, formerly President of the Asiatic Society of Bengal, who was well acquainted with the deceased

* *Journal of the Asiatic Society of Bengal.* Part II. Extra Number, August, 1875. Catalogue of the Mammals and Birds of Burmah. By the late E. Blyth. With a memoir and portrait of the author. 8vo., 168 pp.

naturalist during his twenty years service as Curator of that Society's Museum.

The mammals of Burmah as yet recognized and named according to the present catalogue are about 130 in number. Many of them are either nearly allied to, or identical with, those that occur in the Indian Peninsula. But a large Malayan element creeps up from Sumatra and Malacca, and exhibits itself in such forms as the Tapir (*Tapirus Malayanus*) and the Cobego (*Galeopithecus volans*), which are utterly unknown in India proper. The same is the case with the birds, of which not less than 659 species are included as having been found in the Burmese Provinces. This latter category, however, has been much swollen by the researches lately made by Mr. Allan Hume and Lieutenant Wardlaw Ramsay in Lower Burmah, the recent discoveries of these gentlemen having been carefully incorporated into the original work by the accomplished editor of the ornithological portion.

JOURNAL OF THE ROYAL GEOGRAPHICAL SOCIETY, 1875.

THIS volume contains the history of much laborious and valuable geographical research in every great division of the world, except America. In the Arctic Regions there is the record of the discovery of Franz Joseph Land by Payer and Weyprecht. In Asia we have Colonel Montgomerie's account of the journeys of the Pundits, including the exploration of the country round Lake Tengri-nor in Tibet; Major Herbert Wood's important notes on the lower Amú-darya and Lake Aral; Mr. Coryton's paper on trade-routes between British Burma and Western China; and Mr. Oxenham's on the inundations of the Yang-tse Kiang. Our African knowledge is increased by Cameron's survey of Lake Tanganyika, St. Vincent Erskine's narrative of his journey to Umzila, the survey of the Rufiji river by Captain Sulivan, R.N., and Mr. New's journey from the Pangani to Mombasa. The volume also contains the very important paper and map of the central provinces of Madagascar by Mr. Mullens, that of Mr. Forrest on his expedition through the centre of Australia, and Captain Moresby's account of his examination of the coast of eastern New Guinea in Her Majesty's Ship 'Basilisk.' At the end of the volume we have the long-promised map of Central Asia by Arrowsmith, the last thing upon which the veteran geographer was employed, and which he finished just before his death.

General Hauslab's paper, entitled "Inference applied to geography, with special reference to ocean currents and the Arctic Regions," requires more than a passing notice. Taking the Adriatic to illustrate his view, the General explains that this sea consists of three distinct basins, separated by submarine plateaux. The current runs along the Dalmatian coast to the north, and returns along the coast of Italy to the south. The currents, on encountering the submarine plateaux, bifurcate, so that there are circular currents in each of the basins, as well as the main flow north and south on either shore. General Hauslab holds that these circuit currents are due to the oscillating movement of the earth, known as the rotation of the axis. Comparing the movements in the Adriatic with the great ocean currents, he shows the existence of similar circuits; and proceeds to draw deductive inferences respecting the unknown polar regions. He then states another law respecting the inequalities of the earth's surface, namely that there once existed annular mountain chains on the earth, like those discovered on the moon, now partly destroyed by geological convulsions, so that their continuity is only traceable along chains of islands and submarine plateaux. Thus he traces an annular mountain chain which once surrounded the whole polar basin, and within it may be traced three similar chains of smaller dimensions; by means of which, he holds, the positions of the submarine plateaux separating the ocean basins may be determined. He then compares the unknown area with the Adriatic, both being gulfs rounded off at the ends. The warm current passing through Behring Strait is analogous to the Po entering the Adriatic, while he compares the channel between Norway and Greenland with that between Brindisi and Cape Linquetto, and Pelagosa Island lying within the latter has its counterpart in the Spitzbergen group. Finally, by his theory of annular chains, General Hauslab traces out the positions of the Arctic circuit currents; and he concludes that explorers ought always to follow the direction of these currents.

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YACHTING IN THE ARCTIC SEAS; OR, NOTES OF FIVE VOYAGES OF SPORT AND DISCOVERY IN THE NEIGHBOURHOOD OF SPITZBERGEN AND NOVAYA ZEMLYA. By *James Lamont, F.R.G.S.* Edited and illustrated by W. Livesay, M.D. (Chatto & Windus, 1876.)

MR. LAMONT made yachting trips to Spitzbergen in 1858, 1859, 1869, 1870 and 1871, chiefly with the object of killing large game—walrus, bears, and reindeer. In his *Seasons with the Sea Horses*, published in 1861, he gave an account of his voyages in 1858 and 1859, when he went up Stor Fiord, and got as far east, on the south coast of Spitzbergen, as the Ryk Ys Islands. In the present volume he describes the events of a voyage made in the 'Diana' screw steamer in 1869. Mr. Lamont was accompanied on this occasion by Dr. Livesay, an excellent artist, whose sketches illustrate the book. The 'Diana' went to Waygat Island and Kara Strait, coasted along the western side of Novaya Zemlya as far as 75° N., then proceeded to Spitzbergen, went up the west coast and round Hakluyt Headland, round again to the Thousand Islands, and thence returned home. Mr. Lamont gives an account of the walrus fishery and of the equipment of a walrus boat, with details of the trade; and his discovery of coal in Sassen Bay, a branch of Ice Fiord, in Spitzbergen, is also interesting. We are glad to see that, in the map accompanying this volume, the name of Wiche's Land is properly given to the large island, to the east of Spitzbergen, discovered by the English in 1617, and re-discovered in 1872 by the Norwegian captains Altmann and Nils Johnsen.

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PALESTINE AND SYRIA: Handbook for Travellers. Edited by *K. Baedeker*. London (Dulau & Co.), Leipsic (Karl Baedeker).

MR. BAEDEKER has just completed an excellent guide-book of Palestine and Syria, which appears in German, English, and French, and will be followed by another, on the same plan, of Egypt. The *Palestine and Syria* is really a pattern hand-book. It is of convenient size, easily going into the coat pocket, is clearly printed,

and profusely illustrated. There are 18 beautifully engraved maps, and 43 plans either drawn or revised by Kiepert, a panorama of Jerusalem, and 10 views. The chief writer is Dr. Socin, the Professor of Oriental languages at Basle, who travelled through Syria for the express purpose of preparing Mr. Baedeker's handbook. The botanical notices have been revised by Dr. Hooker, and several valuable notes have been supplied by Lieutenant C. R. Conder, R.E., of the Palestine Exploration Fund. Among the new features of this admirably edited little volume we may notice a carefully prepared bibliography of Palestine, Arabic vocabularies and conversations, some very clear chronological tables, and interesting notices of the fauna and flora. The usual guide-book information respecting hotels, travelling, and expenses, is all that can be desired.

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THE WEST COAST OF AFRICA AS SEEN FROM THE DECK OF A MAN-OF-WAR. By the late Commander *Hugh Mc. N. Dyer, R.N.*, H.M.S. 'Torch.' (Griffin & Co., Portsea, 1876.)

NO apology is needed for the publication of this interesting little volume. Its author, the late Commander Dyer, was serving on the west coast of Africa in the same ship with his brother, who was killed while gallantly leading his boat's crew in an attack on Lagos in 1851. Twenty years afterwards Hugh Dyer was again on the coast, and on his return to England, in 1873, he prepared his journal, kept while in command of the 'Torch,' for the perusal of friends, who have now published it. It enables us to pay a pleasant visit, in imagination, to the Congo River, Cape Coast Castle, Lagos, Accra and Appolonia, the Benguela Coast, and the Bonny.

It was Commander Dyer, in the little 'Torch,' who behaved with such admirable coolness and judgment at Carthagena when the *Intransigentes* were besieged in 1873; but he was afterwards induced to accept the advantageous offer contained in the new retirement scheme, and so was lost to the service.

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REISTOCHTEN NAAR DE GEELVINKBAAI OP NIEUW-GUINEA IN DE JAREN 1869 EN 1870. Door *C. B. H. Rosenberg*, Ambtenaar belast met wettenschappelijke onderzoekingen in Nederlansch-Indië. Met Kaareten en afbeeldingen. ('S Gravenhage, Martinus Nijhoff, 1875.)

WE have, in this work, a narrative of Rosenberg's important investigations in New Guinea. That eminent traveller first received an appointment from the Government of Netherlands India in consequence of his extended and valuable labours in Western Sumatra and the adjacent island. In 1858 he was appointed artist to an expedition to New Guinea, and afterwards undertook to report upon the topography and fauna of the Papuan Islands of Waigeoe, Salwatti, and Misole. He was then appointed Governor of Ceram, and during his term of office he surveyed the interior of that island, and the Bay of Sawaai on its northern shore. After having been twenty-five years in Netherlands India, Rosenberg went home on leave, and on his return to Batavia in August 1868, he received a scientific appointment, and was sent to explore the coasts and islands of Geelvink Bay, during two voyages. On his first voyage he sailed for New Guinea in December 1868, and made a short stay at Dorie, near the western entrance of the great bay. In the summer of 1869 he explored Mefoor and the beautiful Schouten Islands, and sailed thence to the long island of Jappen which stretches half across Geelvink Bay, making large natural history collections. The *fauna* and *flora* are both very rich, and Rosenberg got three species of birds of paradise. From Jappen he went to Meosnœm, a small island to the west, surrounded on three sides by coral reefs, and thence to Andai on the mainland, returning to Ternate in July. He commenced his second voyage in January 1870, proceeding again to Andai on the western shore of Geelvink Bay, and thence inland to Hattam. In his report he gives a very full account of the inhabitants, called Arfaks.

When his reports were received, it was determined to publish them, and they were seen through the press by Professor H. Schlegal of Leyden, while the introduction was written by Mr. Robidé von der Aa. The result is a handsome quarto volume of 150 pages, with vocabularies of the Salwatti, Mefoor, Arfak, and Hattam languages, a beautifully engraved map of Geelvink Bay, and plates of scenery, of the inhabitants of Andai and Hattam, and of birds of New Guinea. Rosenberg's valuable geographical labours have thus been given to the world in a suitable form.

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STUDIO SUI PORTE DI VENEZIA E DI CHIOGGIA. By *Giovanni Antonio Romano.* (Milan, 1875.)

AT the present, when Venice, from its geographical position alone, appears likely to become for a second time one of the principal commercial centres of Europe, and to receive a large portion of the benefits of trade with India, the development of its harbour becomes a subject interesting not only to Italians, but to the whole commercial world. Its port has now remained in a deteriorated and worthless condition for nearly a century, the formerly navigable channel having been silted up and blocked by a sandbar; and a communication from its arsenal to the sea having been established and kept up through the indirect route of a maritime canal extending to the neighbouring port of Malamocco.

The pamphlet of Signor Romano indicates the best known mode of rendering the harbour efficient; and comprehends a solution of the greater difficulty of maintaining it in that state; the bases of his project being the experience gained at Malamocco, whose conditions of coast and of lagoon are very similar to those of Venice, and the principles set forth by Cialdi in his work, *Del moto ondoso del mare*, which, appearing about ten years ago, threw an entirely new light on the solution of the practical problem of removing and preventing the formation of harbour-bars. Apart, therefore, from the importance of this project from an engineering point of view, a great scientific interest attaches itself to the matter, on account of its involving a careful consideration of the phenomena of the winds, tides, currents and lagoons, and their laws and conditions.

The ordinary rise and fall of the tide at Venice is but small, and the scouring effect of the ebb, when diffused over a large shallow width, as that between the Forte San Nicolo and the Punto dei Sabbioni, is comparatively valueless. It hence becomes necessary to create a narrow passage by constructing long sea walls, or nearly parallel converging piers, so that the force of the ebb may act within a long and narrow channel to its debouchment into the sea, and thus obtain greater velocity and produce a greater scouring effect. These piers will then require an alignment suited to the currents to and from the lagoons that arrive through the *porto-canali* of San Erasmo, Treporti, and San Nicolo, passages that had at one time separate exits into the sea. The breadth of the channel thus formed, or narrowest width between the piers, most suitable to the local circumstances, will evidently be that which, *cæteris paribus*, maintains the existing condition of the lagoons, and allows sufficient water-way between them and the sea; this, therefore, is determined from a consideration of the width allowed under corresponding circumstances at Malamocco, and of the proportion of the size of the lagoons in the two cases.

By means of piers constructed on these principles, the fluvial currents, as well as the entire force of the ebb-tide, will be utilized in scouring the whole length of the harbour-channel.

So far the design of Romano is similar to that of

Mati and Contin, although it is also, from being better considered, a manifest improvement on the latter; besides this, it is so far merely an adaptation of old and well-recognised principles, which, however, have not in many cases been successful in preventing the formation of sandbars at harbour-mouths; of this the unfortunate state of Port Said is a notable example. Taking warning therefore from this painful case, it becomes necessary also to take into consideration the effects of the strongest and those of the most prevalent winds, to prevent their obnoxious results, and to utilize their currents in maintaining the harbour entrance free from accumulations of deposit. An examination of these winds, and the marine currents induced by them, thus becomes imperative, while the effect of the littoral marine current, which in this case has but little effect within five miles of the shore, may be entirely disregarded.

The meteorological records of the Seminario from 1836 to the present time, show that the strongest and the most prevalent winds at Venice, blow from the north-east and the east-north-east; their frequency is illustrated in a diagram accompanying the pamphlet. In order to utilize and conduct the resulting current of these winds to the greatest advantage, Romano directs to this quarter a return pier-head or jetty from the extremity of the windward pier, and by also putting a breakwater in continuation of the alignment of the windward pier, allows the conducted current to act through the opening thus left across the harbour entrance and outwards towards the sea. The alignment of the piers having been directed in accordance with this portion of the design, the continued tendency of the conducted current is to sweep all detritus seawards, and to keep the entrance of the harbour under the strongest and most persistent scouring influences. It is hence evident that, when once a navigable passage of sufficient depth has been dredged, it will under such circumstances continue to improve, instead of to deteriorate, without further assistance.

The plans accompanying the pamphlet illustrate the application of these principles to the ports both of Venice and of Chioggia, and lead us to the apparently inevitable conclusion that, although projects for the improvement and reconstruction of the former port have been repeatedly brought forward for a whole century, it has yet been left for Signor Romano to develop a design in accordance with correct scientific principles, that have been ignored by all his predecessors.

Cartography.

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WE have before us now the whole of the new edition of STIELER'S HAND ATLAS, a well-known work, first issued in 1817, a memorable year in the annals of geography, for it was in that year that Carl Ritter published the first volume of his *Comparative Geography*, which has exercised so large an influence upon methods of geographical study. Stieler's Atlas has since then passed through many editions, which reflect, in some measure, the progress of the cartographic art in Germany. Its first publisher, Wilhelm Perthes, who died in 1853, and his successors, have at all times taken a pride in supplying the public with maps of a superior character. They have not looked upon the plates forming this atlas as an heirloom, to yield profit year after year, without further investment of capital, but have caused them to be carefully revised, or entirely new plates to be substituted for them, whenever this was rendered desirable by the progress of topographical surveys in Europe, or of geographical exploration in other parts of the world. A glance through the present edition proves this. Out of the ninety maps of which it consists, there are only five which date from the days of Adolph Stieler, who died in 1836, whilst no less than sixty-eight entirely new plates have been added since Dr. A. Petermann took his place at the head of Perthes's geographical establishment. The influence of that eminent cartographer is apparent throughout the new work done. Forty-one maps have been compiled by him, nearly all of them referring to extra European countries. Most valuable amongst these are his maps of the United States, in six sheets, of North-Eastern and Southern Africa, and of India and Central Asia. The latter is based upon the Indian Atlas as far as published, but the edition has unfortunately been printed before information respecting the most recent explorations on the Upper Oxus had been received. Amongst Dr. Petermann's coadjutors, W. C. Vogel occupies the most prominent rank. We are indebted to him for most excellent maps of the Iberian Peninsula, of France and Germany, and his map of Switzerland we look upon as one of the finest examples of draughtsmanship, nobly seconded by the engraver's art. Mr. H. Berghaus, a worthy son of a worthy father, has supplied two capital physical charts illustrative of meteorology and ocean geography. A work embodying so great a variety of information, and the publication of which extended through several years, is naturally open to criticism. Its general excellence, however, is very great, and we therefore leave the invidious task of criticising details to others.

The PUBLIC SCHOOLS' ATLAS,* edited by the Rev. George Butler, of Liverpool College, is undoubtedly far superior to the generality of School Atlases. The names are large and distinct, the maps are not over-crowded with detail, the delineation of the various countries, as far as mere outline is concerned, is fairly correct, the printing is done unusually well, and the paper is good. At the same time this collection of maps is very far from realizing our idea of what a School Atlas ought to be. We object, first of all, to the great variety in the scales upon which the maps are drawn. England, Scotland, and Ireland, for instance, are drawn on different scales, that for England being smallest, and this is all the more matter of regret as the Atlas is without a map of the British Islands. The maps of the Netherlands and of Switzerland are actually on a larger scale than that of England, and whatever the importance of these countries may be, in an English school it ought to yield to that of the native country. The editor claims some credit in the preface for the care devoted to the spelling of the names; yet it will hardly be deemed consistent to spell Khartoom, Siout, Borgou, Borgu and Tebu, or Erzeroum, Beloochistan and Hindu Kush on the same map. The omission of accents in French names is likewise reprehensible. Nor has the nomenclature always been sufficiently attended to. On the map of Europe we have a "Gulf of Lyon," on that of France a "Gulf of Lion," whilst it ought to be "Gulf of the Lion," and the event in which that name originated would certainly interest school-boys. Nikolayef, which next to Odessa is certainly the most important town on the Black Sea, has been omitted altogether on the map of Europe, and is printed in small type on that of Russia. The nomenclature of the Alpine club map, published by Stanford, might have been adopted with advantage for the map of Switzerland. We agree with everything the editor says in the preface. He is evidently a man of sound principles, but does not always carry them into practice, or he would have bestowed a little more attention upon a more satisfactory delineation of the physical features, in as far as these consist in mountains and table-lands. This might certainly have been done without detriment to the clearness of the maps. But take it for all in all, this is certainly the best English School Atlas with which we are acquainted.

E. G. RAVENSTEIN.

* The Public Schools' Atlas of Modern Geography, in 31 maps, edited by the Rev. George Butler. New edition. London (Longmans), 1875.

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Communication with the Arctic Expedition in 1876.—In reply to a question in the House of Commons, on February the 18th, on the subject of communicating with the Arctic Expedition this year, Mr. Ward Hunt said :—"The arrangements made by the advice of the Arctic Committee, and with the full approbation of Captain Nares, provided for the sending out of a relief-ship in the Spring of 1877 to the entrance of Smith's Sound, unless the Expedition should have previously returned. A letter received from Captain Nares states his intention of sending a sledge-party down to that locality in the spring of 1876 with despatches. The Admiralty have arranged with Mr. Allen Young, who was contemplating a voyage to the Arctic Regions this year in his yacht, to look for cairns in which such despatches might be deposited, and he has, with great public spirit, consented to make this the primary object of his voyage, undertaking to bring home any such despatches, unless he can find means for sending them to England otherwise." This arrangement was announced, and the reasons which make it necessary were fully explained in our January number. The Admiralty have wisely taken steps to do what the country would otherwise have insisted upon. If one ship has been lost, and the two crews have been crowded together, it will be indispensable that a portion should be sent home, and there are other possible contingencies which necessitate the precaution of communicating this year. If the gallant explorers have to face a second winter it is a matter of great moment that they should receive letters from England, and thus enter upon their second campaign with a feeling that they are cared for at home, and not forgotten. The mere picking up of letters *from* the Expedition, if all has gone well, is of very trifling consequence, when compared with the really urgent reasons for this measure.

Those who have relations in the Arctic Expedition feel the full value and importance of Captain Allen Young's public-spirited undertaking. He will leave this country with the satisfaction of knowing that he takes with him their warmest thanks and good wishes. Nor does the country at large fail to appreciate his services, and he will assuredly receive the public gratitude which is his due, for thus, at considerable risk and in the face of no ordinary difficulties, carrying out the precautionary measure which is required for the welfare of the Arctic Expedition.

The feeling of the country, as regards the necessity for communication this year, is represented by the movement in the West of England. A memorial on the subject, from seventy of the leading inhabitants of Falmouth, has already been presented to the Admiralty. A petition to Parliament from Plymouth and Devonport has received about a thousand signatures. These movements show that public opinion will insist on all necessary precautions being taken for the safety of the Expedition. If due provision had not been made for communication in 1876, there would have been few cities in Great Britain that would not have followed the good example set by the western ports.

German Expedition to Siberia.—In consequence of a memorial presented to the Bundrath, by the Society for the Promotion of a German Arctic Expedition, on the 30th of December, 1874, a commission of thirteen was appointed by the Imperial Chancellor to consider the question of a fresh national expedition to the Polar regions. The report of this commission did not recommend the despatch of an exploring expedition, but the institution of scientific observations at three stations, with two or three expeditionary trips and yearly communication for the sake of keeping up a knowledge of the movements of the parties and furnishing them with supplies. But the Society, feeling that it was possible for it to do more in helping towards Arctic research, has arrived at the following resolutions :—(1) That explorations might be conducted by it uniform with those previously undertaken, but arranged so as not to clash with the greater national projects. (2) That the field of action must be close enough to be reached without much outlay, and in a comparatively short space of time, and yet must promise valuable results. (3) That exploration by ship being put out of the question, a region must be selected, which, though not wholly unknown, is yet sufficienty unexplored to promise a good harvest of scientific materials; and (4) That, as far as is consistent with the main object, the region selected must be one which is likely to become, sooner or later, accessible to German commerce.

The Russian empire, more especially Siberia, appears to fulfil all these conditions. From time to time members of the Imperial Academy, and of the Imperial Geographical Society, and private gentlemen of scientific acquirements, have made special researches, to which our present knowledge of Siberia is mainly indebted. Two scientific persons might do a good season's work in the region of the Obi and Yenisei Rivers, and journey there and back in the space of eight or nine months, say from March to the end of October. There is a railway route from St. Petersburg to Nijni Novgorod, and both the rivers above mentioned are navigated by steamers in the summer season. The Russian Government would doubtless encourage such an enterprise. The probable cost would not exceed 18,000 marks, and this could be defrayed partly from the balance in hand of the Society, and partly by special subscriptions. In consequence of the interest excited by Nordenskiold's journey, two ships will be sent during the approaching summer to examine the sea routes of communication between Archangel and the estuary of the Obi. To such an undertaking the proposed expedition to Siberia would form a very appropriate and valuable complement.

The two gentlemen deputed to make the researches referred to are Drs. Otto Finsch, Curator of the Museum of Natural Science at Bremen, and A. E. Brehm, both of whom possess ample qualifications for the task. Count Waldburg Zeil, known for his journey to Spitzbergen, in company with Heuglin in 1870, has also joined the expedition as a volunteer. The Society announce, in conclusion, that special attention and a special section of the published account of the journey, will be devoted to practical and commercial matters, such as the products, industries, trade, and means of communication of Siberia.

Document Discovered in Novaya Zemlya.—Some months ago it was reported that the captain of a Norwegian vessel from Hammerfest, had discovered an ancient journal on the coast of Novaya Zemlya, which was supposed to be that of Barents. Mr. S. Muller, the Historian of the Dutch Northern Company, suggested that it might be the journal of Brunel. The Hammerfest captain has at length allowed it to be examined, and it is reported to be a translation of the journal of Pet and Jackman. Mr. de Jonge has compared it with the journal published in Hakluyt, and it is identical.

The Extinction of the Great Auk in America.—In the number of the *American Naturalist* for January, 1876, there is an interesting account of the extinction of the great auk, at Funk Islands, communicated by Mr. Michael Carroll, of Bonavista, in Newfoundland. Mr. Carroll says that these birds were formerly very numerous on the Funk Islands, but about 50 years ago they were hunted for their feathers, and soon afterwards they were wholly exterminated. The fishermen surrounded them in small boats, and drove them on shore, into pounds constructed of stones. They were then easily killed, and their feathers removed by immersing the birds in scalding water, which was ready at hand in large kettles. The bodies were used as fuel for boiling the water. This wholesale slaughter soon exterminated these helpless birds, none having been seen for more than 30 years.

Arrangements for sending Lieutenant Cameron's followers to Zanzibar.—Lieutenant Cameron has seen to the safe return home of his Zanzibar followers, and would have gone with them, had not Captain Hopkins, Her Majesty's Consul at Loanda, insisted on his proceeding direct to England. He and the Consul have bought a schooner at Loanda, and secured the services of Captain Alexandersen, a Swede, who is already favourably known for his survey of the river Kwanza, to take her round to Zanzibar. Cameron has had to fit her with running rigging and sails, and water-casks, which are all new oil puncheons. The schooner is admirably adapted for the coasting-trade, and will no doubt fetch a good price at Zanzibar, while the oil puncheons will be readily purchased by one of the oil-producing houses. It is hoped that the men will thus be got round to Zanzibar for the price of their provisions, and the pay of Captain Alexandersen and four or five seamen. The schooner has been named the 'Frances Cameron.' During his detention at Loanda the explorer has been working hard at his sights and sections.

Thanks to the intervention of Viscount Duprat, the Portuguese Governor had been most kind and civil, and Cameron's people were comfortably housed in the fort.

Ashurada and the New Persian Fort on the S.E. shore of the Caspian.—The Persian correspondent of the *Journal de St. Petersbourg* in a recent letter from Resht states that the Shah has just returned to Tehran after a tour, in the course of which he inspected the new fort that is being built by the Governor of Mazanderan at the eastern extremity of the promontory of Mian-Kale. It is composed of four towers, two facing north and two east, and the walls, which are about seven bricks in thickness, are pierced with loopholes for sharpshooters. The fort will be large enough when completed to accommodate fifty families. The promontory on which it stands is separated from the island of Ashurada, the Russian naval station, by a strait about 5 versts in breadth. The same authority states that on the night of the 31st of December a gale swept over the southern part of the Caspian, and occasioned the most serious damage and loss of life. The northern part of the island of Ashurada was inundated, houses and vessels were wrecked, and so much land was and is still being washed away that prompt and vigorous measures will have to be taken if the Russians wish to save their naval station.

Marine Surveys in British India.—The wreck chart and the statement of casualties to shipping, during the last two or three years, showed that the great ports of Burma, and their approaches stood more in need of careful surveys than any other portion of British India. Lights, buoys, and beacons have been established, but their insertion on a chart of a delta seaboard, which merely represents the positions of the coast and soundings as they existed more than 20 years ago, cannot add much to the safety of navigation. Captain A. D. Taylor, the Superintendent of Marine Surveys, arranged that the 'Clyde' should leave Calcutta last November for Rangoon, to execute a large scale plan of the approaches to the river, and then proceed to Amherst to make a similar plan of the approaches to the Maulmain River. On completing the approaches to Amherst, the 'Clyde' was to re-survey the approaches to the Bassein River up to Port Dalhousie, and then to do similar work at Akyab. By this time Lieutenant Jarrad, the able young surveyor in command of the 'Clyde,' will have completed a good survey of the river entrance to Rangoon. The difficulties of the Rangoon Survey are, however, very formidable. Lieutenant Jarrad says, "Nature appears to have set her face against any interference with the Rangoon River and its secrets. When it does not blow and the tides take off, we get fogs so thick that we cannot see the fore part of the ship. This is very trying. The tides are so strong that tide-poles are continually being washed away—the steam cutter cannot force the strength of tide—we can only sound for about an hour at slack water. Row boats, manned by the wretched Bengali lascar, are useless—tides run seven knots in places." The survey of Akyab will include the Oyster Reef, with the new lighthouse now being erected. Meanwhile, the 'Constance,' commanded by Lieutenant Hammond, is surveying False Point and the Palmyra Shoals.

Mr. Carrington, the admirable draughtsman attached to the Indian Marine Survey Department, has made good use of his time. He has already completed a beautifully executed navigating sheet from Karáchí to Vingorla; and the new charts of Kolachul and Cocanada.

Great Earthquake in Peru.—On the 4th of December, 1875, the town of Abancay is reported to have experienced no less than 37 severe shocks, and to have been almost completely destroyed. The extensive valley of Abancay, covered in its whole length with fields of sugar-cane, is in the very heart

of the Andes, but it is not in the line of volcanic disturbance, and is outside the region usually visited by destructive earthquakes. The river Pachachaca, a tributary of the Apurimac, crosses the centre of the valley, and divides the department of Ayacucho from that of Cuzco; and the pretty little town of Abancay, on a height overhanging the river, is surrounded by large fruit-gardens. The name is from the Quichua word *amancay* (a lily). The Andes rise from the valley in towering masses, until their summit ridges are covered with eternal snow, while at their bases grow pine-apples and bananas. Abancay is historically interesting as the scene of the battle between the Marshal Almagro and Pizarro's partizan, Alvarado, on the 12th of July, 1537, a few months before Almagro was finally overthrown by Hernando Pizarro at Las Salinas. It is in 13° 31′ S. lat., and 40 miles from Cuzco. We trust that the disaster to this pleasant little town, and its kindly and hospitable inhabitants, is not so great as is at present reported.

Ecuador.—In our number for October 1875 (page 318) we anticipated the advent of a better state of things in the republic of Ecuador from the assassination of the tyrant Garcia Moreno, and our hopes now seem to be in the way of fulfilment. The Jesuits have been expelled, General Saenz secured the peace of the country during the elections, and on the 8th of December, 1875, the liberal candidate, Don Antonio Borrero, was solemnly inaugurated as President of the Republic, in the cathedral church of Quito. Señor Borrero is a native of Cuenca, a man of education, and a writer on political subjects. His first speech is able and statesmanlike, and gives promise of a return to the days of Rocafuerte, the best ruler and truest patriot that Ecuador has produced. We take special interest in the well-being of the equatorial State, because a vast area of its *montañas* is unknown and unexplored, while with peace and prosperity will come enterprise and geographical discovery. By the latest returns (1874) the value of the exports from Guayaquil was 676,635*l.*; of which 437,878*l.* was for cocoa, 42,760*l.* (10,690 quintals) for India-rubber, and 34,338*l.* (9811 quintals) for chinchona bark.

Obituary.—Rear-Admiral A. B. BECHER, who died on the 15th of February, was an original member of the Royal Geographical Society. He entered the navy in 1812, and took to the surveying branch, being employed on surveys of the Canadian lakes, the Azores, and Cape Verds. He was for many years in the hydrographic office at the Admiralty, and editor of the *Nautical Magazine*. In 1842 he communicated an elaborate paper to the Geographical Society on the voyages of Sir Martin Frobisher (*R.G.S. Journal*, xii., p. 1), and in 1856 he published *The Landfall of Columbus*, in which he identified Watling Island with the Guanahani of Columbus. In this identification Mr. Major, in his learned paper on the same subject, read in May 1871 (*R.G.S. Journal*, xli., p. 193), fully concurs with Captain Becher, although he disagrees as to the point where Columbus first anchored, and as to his movements while at Guanahani. Captain Becher was also the author of the *Voyage of the 'Chanticleer.'* He became a retired Rear-Admiral in 1874, and at the time of his death he had reached his 80th year.

The Marquis SÁ DE BANDEIRA, one of the most eminent soldiers and statesmen of Portugal, died on the 6th of February at Lisbon, aged 81. He was a great promoter of geographical research, and has himself written several papers on the Portuguese possessions in Africa.

Count MINISCALCHI-ERIZZI, one of the founders of the Italian Geographical Society, died suddenly on the 30th of December last. He had taken charge of the Akkas for the purpose of studying their language, and was engaged, at the time of his death, upon a work on Arctic exploration.

GEORGE POULETT SCROPE, best known through his volcanic theories, died on the 18th of January, at Cobham, Surrey, at the age of 79.

Dr. RICHARD KING, the companion of Sir George Back during his journey to the shores of the Arctic Ocean, died on the 4th of February. He was the author of several geographical and medical works, and the founder of the Ethnological Society.

MM. MARCHE AND COMPIEGNE ON THE UPPER OGOWAI.

To the Editor of the "GEOGRAPHICAL MAGAZINE."

SIR,—In a letter addressed to you by Mr. R. B. N. Walker, and inserted in the February number of your magazine, I observe with regret that some reproach is cast on my friend A. Marche and myself for having slain some Osyéba natives on the occasion of our exploration of the Upper Ogowai.

Mr. Walker (whose good offices and hospitality I have had occasion gratefully to acknowledge in the published account of our travels) ought however to know, by personal experience, that in Equatorial Africa one is frequently compelled to use force to defend one's own life; he will also doubtless remember that on the 1st of January, 1874, M. Marche and I when at Adanlinanlango on his coasts, worked and helped to fortify his factory against a threatened attack of Cama, who had sworn to take his (Mr. Walker's) life.

With regard to the particular occasion of which Mr. Walker speaks, I may be permitted to observe:—

1st.—That with the hope of conciliating the Osyébas, I lived for three days in the midst of them, completely at their mercy, and made them presents.

2nd.—The eve of the attack, when hostilities were evidently impending, M. Marche disembarked alone, and went unarmed into the midst of the Osyébas, carrying presents and making every sort of friendly demonstration.

3rd.—At the moment that I first fired, six men of my boat (which was ahead of M. Marche's) lay either dead or severely wounded by the treacherous fire of the Osyébas.

4th.—M. Marche (as I have stated in my second volume), having the lives of eight or ten Osyébas in his hands voluntarily let them go.

In short, I can assuredly state that Marche and myself acted as humanely as we possibly could with the attempt to avoid blood-shedding, and that we only had recourse to arms when we were in immediate danger of being taken captive and eaten by the Osyébas.

I trust, Sir, that you will excuse this justificatory plea; no one can condemn more than I do the use of violence in a traveller, and I have thought this explanation due to my friend Marche, who is now making a second journey to the Ogowai, even more than to myself.

I have the honour, &c.,

(Signed), MARQUIS DE COMPIEGNE, F.R.G.S.

General Secretary of the Cairo Geographical Society and Laureate of the Paris Geographical Society.

CAIRO, *14th February*, 1876.

Proceedings of Geographical Societies.

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ROYAL GEOGRAPHICAL SOCIETY.

Meeting of January 24th, 1876.

CAPTAIN THE HON. G. NAPIER'S JOURNEY ON THE TURCOMAN FRONTIER OF PERSIA.

THE PRESIDENT, SIR HENRY RAWLINSON, took the chair at 8.30 P.M. In introducing the subject of the evening's business the President remarked that last year considerable interest was excited in England by the Russian movements on the Caspian, and to the east of that sea. It so happened that at the same time there was occasion for the presence of a British officer in Persia, to examine into the circumstances of a raid which had taken place on the Afghan frontier near Herat. Captain Napier, son of the Commander-in-Chief in India, was sent there for that purpose, and knowing the interest taken in the Turcomans, he returned along the Persian frontier, from the vicinity of Merv to the Caspian, and had sent home a most elaborate report upon that tract of country. This was of special interest, because that line formed the boundary between the new Russian territory and the kingdom of Persia, and also because it was the only even moderately accessible route for troops from the Caspian towards Afghanistan. Captain Napier's Report was of such length that it could not be read to the Meeting *in extenso*, and Sir Frederick Goldsmid, who had himself surveyed a great part of that district, would select such portions as he might consider most important. Colonel Macgregor, of the Quartermaster-General's Department, who had very recently arrived in England from the Turcoman frontier, would afterwards furnish some particulars of his journey in those regions.

Sir FREDERICK GOLDSMID then read his paper on Captain Napier's journey. In our July (1875) number we gave an abstract of Captain Napier's interesting report, tracing his entire route, to which we would respectfully refer our readers.

In the discussion which followed the reading of the paper, Colonel MACGREGOR said he started from Bushire with the intention simply to ride through Persia; but on reaching Shiraz the desire of travelling grew upon him, and he determined to make for Yezd by a route which, although it had been followed by a French officer in 1810, had not, he believed, been traversed by any Englishman. From Yezd he went on to Tubbus, and took the same road as Captain Christie in 1810. Captain Christie, however, had to pass through in disguise, and therefore was not able to make sufficiently copious notes; so that it was very difficult to follow his route exactly. A little beyond Yezd a portion of the great desert of Kubeer was reached, which ran from Tehran down to the south of Tubbus, where it is connected with another desert—the Dasht-i-Lóot; after that, extending right on through Beluchistan, almost to Sindh. In order to get through the portion between Yezd and Tubbus he had to make a march of 70 miles, no water being obtainable for that distance. From Tubbus he went to Toon, and then crossed a range of hills, till he arrived at a place called Kullat, where he struck upon the road followed, in 1873, by Sir F. Goldsmid's mission. Thence he went to Birjund and afterwards pursued the route taken in 1858 by some officers of Khanikof's mission, straight across to Herat. He was, however, stopped when about four miles outside Herat by the Afghans, who would not let him enter the town, and he was obliged to turn down a valley to go off to Mash-had. His object in wishing to enter Herat was to see what was the real importance of the Herat valley, and the fortifications, and then if possible to go on in the direction of Bamain—the Herat valley route never having been followed by any European throughout its entire length. At Mash-had he made arrangements for going to Merv, getting Turcoman chiefs to come in as hostages for his safe return, but before starting received an order from the British Government not to go beyond the Persian frontier. From Mash-had he went to Sarakhs, and then rode about 15 miles across the desert in the direction of Merv with a party of cavalry, so that although he did not visit Merv, he saw the character of the country there. He returned by nearly the same route as that taken by Captain Napier. The Elburz range was continued without a break to the north of the main road from Shahrud to Mash-had. Beyond Mash-had it was again continued to the south. The watershed between the southern range, and that of the Atak, was almost imperceptible; and, in fact, until the traveller got on it he imagined that it was a plain between the two ranges. The Atak range ran along very nearly parallel the whole way from the Tejend River to the Caspian. Between that and the southern range there were two valleys, one draining to the south-east towards Mash-had, the other to the west, being the valley of the Attrek. North of the Atak range all the water drained into the strip of country known as the Atuk, and beyond that it was lost in the sand; some of it, however, occasionally reaching the Tejend River. The Tejend gave a turn off to the north-west, and between it and the last of the water from the Atak range there was a tract of perfectly waste country. The road taken by Captain Napier from Nishapur to Mash-had, by the village of Dehrud, went over the range at a comparatively high part, but a little to the south of that there was another road, known as the Sherifabad road, which passed over one of those low depressions so common in all Persian ranges of mountains. From the Sherifabad road the range ran away south, without a break, but it turned off to the north of Birjund finally going in the direction of Herat, so that practically the mountains north of Tehran were connected with the mountain-system of Afghanistan. With regard to the Persian frontier, it was not generally known where it ran to the north. The Russians had taken possession of the country from Chikishlar to Krasnovodsk, but beyond their present posts up in the direction of Kizil Arvat it was quite uninhabited. The district really belonged to Persia, but the Persian Government was too weak to take possession of it; and it was, therefore, simply a raiding ground for the Turcomans. Until recently the Akhals had been more or less subject to Persia, but their country was now considered to be beyond the Persian frontier. In the Deregar Atak, and the Atak of Kelat, however, there were several Persian villages and forts. That part of the country must, therefore, be distinctly considered as belonging to Persia. The question was, how far did that extend? Practically, it extended as far as the water went, and that really was the frontier of Persia. From Deregar the boundary line ran to the north of the Atak range as far as that range stretched. To the east it reached as far as Sarakhs, which was held by a considerable Persian garrison; and he was of opinion that the Persian frontier really extended from the outer limit of the water of the Atak the whole way to the Tejend River.

The PRESIDENT said he had not himself been exactly in that part of Persia, his own personal observations having been confined to the lower part of the range from Tehran or the Caspian to Mash-had. Captain Napier's report was of great interest, both politically and geographically. Politically, because it described the country which was at present in dispute between Persia and Russia, and which afforded the only accessible road for a European army from the Caspian towards India. That fact alone would make it of great importance. Of course he did not mean to suggest that there was any immediate prospect of its being used for that purpose; still as the line of least resistance it must always be of considerable interest to the Government which administered India. The point at present in

dispute between Persia and Russia was the boundary of the former country. The Russians had assumed that the Attrek was the boundary; but the Attrek was, in reality, no boundary. All that the Persians had conceded was that that river should be the boundary at its mouth and for a short distance from the Caspian, but on approaching the hills the Persians claimed the watershed—all the country watered by the streams flowing into the Attrek—while they consented to those flowing northward being excluded from their territory. That would probably be the basis of delimitation whenever a commission was appointed to decide the question, similar to that over which Sir Frederick Goldsmid presided in Seistan. With regard to the actual line of country along the northern hills, the Russians had actually penetrated only as far as Buerm, about 50 miles to the eastward of Kizil Arvat; at the same time they had sent out their scouts and accurately surveyed the whole line, so that on the Russian official maps every village from Kizil Arvat to Merv was accurately laid down. For the last two or three years there had certainly been very much less agitation, and much less indication of restlessness on that frontier than previously. All that was known at present was that the Russians were occupied in selecting a site for a fort near the site of the old Kari Kilelo. Captain Napier's report had brought to light several very important matters, not only with regard to the present but to the past geography of the country. The Russians had lately claimed to have made very important discoveries; but he could prove that, in reality, those discoveries were due to Englishmen, and not to Russians. He was by no means jealous of Russian discovery and research—in fact, the Society was very much indebted in many cases to Russians; but he felt that when Englishmen had made a discovery, they were entitled to the credit of it. It was not pretended that the old bed of the Oxus could be traced exactly; but the Russians claimed to have discovered it approximately.

Sir HENRY then read a number of interesting notes, proving that to Englishmen really was due the credit of many important discoveries in that region, now claimed by Russians. In conclusion, he said that Captain Napier had furnished a special report on the Turcomans, and it was most satisfactory to learn, now that the slave-markets were shut up, that the Turcomans were gradually giving up their marauding habits and becoming agriculturists. If they would only turn their swords into ploughshares, they had a magnificent country, watered by the Murghab and the Tejend, and they might become a blessing to Persia instead of a curse.

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BERLIN GEOGRAPHICAL SOCIETY.

February 5th, 1876.—Baron Richthofen in the chair. The President announced that the German Polar Society at Bremen had determined to send Drs. O. Finsch and Brehm to Western Siberia, to explore the valleys of the Obi and Yenisei. These naturalists would be accompanied by Count Waldburg-Zeil.

Lieutenant Lux, one of the members of Homeyer's expedition, then reported on his journeys whilst in Western Africa. He had reached Loanda on the 2nd of May, 1875, and hearing that Major Homeyer and Dr. Pogge were already at Punge Andongo, he at once started for that place, and arrived there on the 10th of June. Homeyer was then suffering most acutely from fever and rheumatism, and had determined to return home. Dr. Pogge and Lieutenant Lux felt bound, by their instructions, to make an effort to penetrate into the interior. They soon reached Malanje, a place at some elevation above the sea, and enjoying consequently a healthier climate, where they engaged 114 carriers. On the 14th of July they started for Kasanje. After three days' march they crossed the Talamongonga Mountains, 4000 to 5000 feet in height, and on the 23rd day they reached the Quango River, which Lieutenant Lux ascended to its source. He found that it rose on a hilly table-land, together with three other rivers, one of which he looked upon, for etymological reasons, as the veritable head of the Congo. Continuing their journey by way of Porto Musessa, the expedition, on the 26th of August, arrived at Kimbondo, a place in Lunda, the country of the Muata Yanvo. An attack of fever compelled Lieut. Lux to relinquish all further exploration. He returned through Masinje and the Kasanje Valley to Malanje, which he reached on the 9th of October. On the 31st of October he was at Loanda, and four days afterwards embarked on board the 'Monrovia' for Europe. Lieut. Lux has made a survey of the route travelled, and determined the position of seven places by careful astronomical observations.

Baron Richthofen said that the observations made by Lieutenant Lux would no doubt prove valuable additions to those obtained by Lieutenant Cameron, and he trusted that Dr. Pogge would succeed in reaching the capital of the Muata Yanvo, which was reported to have a population of between eighty and a hundred thousand inhabitants.

Dr. R. Kiepert offered some remarks on Lieutenant Lux's supposed sources of the Congo.

Mr. von Horn von dem Horck then reported on a journey from the Arctic Ocean through Lapland to the Gulf of Bothnia, and thence through Finland to St. Petersburg, which he had made last year, accompanied by a member of the Paris Geographical Society. Very little was known about the interior of the countries visited by them, and they succeeded in making an interesting collection of skulls, implements, &c., which he exhibited to the meeting. The country travelled through abounded in lakes, rapids, and waterfalls, which rendered progress with boats exceedingly slow. The features of the country were dreary in the extreme. And the only variety was offered by a few Lapp villages, whose log-houses were covered with earth and moss.

Dr. Rein then delivered an address on the "Characteristics of Japan," many parts of which have been visited by him.

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VIENNA GEOGRAPHICAL SOCIETY.

NINETEENTH ANNUAL MEETING.

December 28th, 1875.—Dr. F. von Hochstetter in the chair. The President proposed, on behalf of the Council, the following be elected honorary members, viz., M. G. A. Daubrée, Director of the Mining School of Paris, M. B. de Beaumont, President of the Geographical Society at Geneva, and M. P. de Semenof, Vice-President of the Russian Geographical Society, which was done unanimously.

The President then read his report on the progress of geography during the past year, with special reference to Austria. The progress of the various labours entrusted to the Geographical Institute had been satisfactory. The triangulation and spirit levelling had been continued: the latter extending over 1740 statute miles; the third volume of the *Astronomisch-geodätischen Arbeiten* had been published, and the longitude of a number of places determined by telegraph. The base-line near Kranichsfeld had been carefully re-measured, and other work done in connection with the European measurement of a degree. Sixteen "mapping detachments" had surveyed, in the course of 1875, 2066 square miles in Galicia and Hungary, on a scale of 1:25,000, and they had likewise determined 200,000 altitudes. The surveyors had been furnished with new theodolites, by E. Schneider of Vienna, which were spoken of very highly. Of the new map of Austria and Hungary, on a scale of 1:75,000, no less than 73 sheets had now been published, and 76 others were in an advanced state. The former included the whole of the Tyrol (welcome news, no doubt, to our Alpine tourists), the greater portion of Transylvania, and parts of Lower Austria and the Bukowina. Scheda's map of Central Europe (1:576,000), had been completed,

and eighty-five sheets of the enlarged edition of this map (1:300,000) had now been published.

The surveyors of the Geological Institute had been at work last year in the Tyrol and in the Carpathians. The Central Institute for Meteorology and Terrestrial Magnetism had been busy last year in testing and examining numerous new and novel instruments which had been supplied to it. There were now in connection with the Institute 175 meteorological stations, in addition to 49 for measuring the quantity of rain only, and the original observations of ten of these were now being published regularly, in accordance with the programme laid down by the Meteorological Congress at Utrecht. The Austrian Meteorological Society numbered 337 members, and its *Zeitschrift* was being appreciated more highly from day to day. The Adria Commission for exploring the Adriatic had sustained a heavy loss in the death of Dr. E. Stahlberger. No successor had as yet been appointed, but it was intended that the meteorological and tidal observations should be continued by three professors of the Naval Academy at Fiume, whilst a scientific man, stationed at Trieste, would be charged with the conduct of excursions, a government steamer being placed at his disposal for that purpose. The Statistical Department had not as yet been reorganized, as proposed, but its publications, particularly the *Jahrbuch* and the *Monatsschrift*, exhibited an earnest endeavour to keep abreast of the time. Passing over to private institutions, the President spoke in terms of praise of the publications of the *Verein für Landeskunde* in Lower Austria, and of the *Comité für die naturwissenschaftliche Landesdurchforschung* of Bohemia. The former was publishing a map in 111 sheets, and a topographical account of Lower Austria, whilst the latter was contributing most successfully towards a knowledge of the physical geography of Bohemia.* The Oriental Museum had done some service to geography, by lectures, and by the formation of a library. In conclusion the President rendered an account of the work done by Austrian scientific travellers. The Imperial corvette 'Friedrich,' Captain Oesterreicher, which had left Pola on the 16th May, 1874, was expected home in the summer of 1876, and the observations made on board of her would no doubt prove useful additions to our knowledge of the physical geography of the sea. Dr. R. Von Drasche-Wartinberg, a geologist, had started in July last for a journey which was to extend over several years. He was accompanied by Dr. C. Körbl, a zoologist, and proposed to visit Réunion, the Philippine Islands, Japan, the Kuriles and Kamchatka. Dr. A. von Roretz had made several interesting excursions in Japan. Dr. E. Tietze had returned from Persia, where he had resided for more than two years, engaged in geological researches. Dr. Stache had examined the geological features of the isthmus of Gabes, with special reference to Captain Rondaire's proposed Algerian inland sea. Dr. Marno was still at Khartum, and of the two Austrians attached to the German West African Expedition, Dr. Lenz still remained on the Ogowé, whilst Lieut. Lux had returned home. The geological researches carried on in Turkey by Dr. Neumayr and Dr. F. Toula, and in Greece by Messrs. Th. Fuchs and A. Bittner, had added largely to the knowledge acquired through the explorations of Dr. Boué and of himself, and as these geological surveys were to be continued, we might expect to be in possession, at an early date, of a trustworthy map of the Balkan Peninsula. Dr. Couze's visit to Samothrake had been devoted to archæological researches. An enumeration of these various expeditions proved that a love of travel and of scientific research had been awakened in their midst, and government was only doing its duty by extending its support to labours of this kind, for an extension of our geographical knowledge could not fail to exercise a favourable influence upon an extension of our commercial relations, and was thus one of the most efficient means of increasing the national wealth.

Mr. A. Becker then stated that the Society now consisted of 55 honorary, 124 corresponding and 605 ordinary members. They exchanged publications with 284 societies, &c., and had now in their library 4172 works and 2178 geographical views and illustrations. Amongst those who had been most liberal in their donations to the library he mentioned the Crown Prince Rudolf, the Archdukes Leopold and Ludwig Salvator, and Mr. Wallon, the French Minister of Education. It had been proposed to publish an illustrated monthly, in addition to their *Mittheilungen*, with a view to its being circulated amongst the general public, but the realization of this scheme would depend to a large extent upon financial considerations.

Dr. J. E. Polak then rendered an account of the financial position of the Society, Their expenses, in 1875, had amounted to 628*l.*, including a grant of 100*l.* to Dr. Marno, and they had now in hand 303*l.*

The meeting then proceeded to the election of seven members of the council and of two auditors. Mr. J. Payer, the late Secretary of the Society, had resigned on account of ill-health, and Baron Glanz was elected to fill his place.

January 25th, 1876.—Dr. von Hochstetter in the chair. Dr. Karpf, the librarian of the Society, announced the receipt of printed catalogues from numerous libraries in Germany, Switzerland and England, which he proposed to make use of in the compilation of a geographical bibliography.

The President then read a letter from Dr. R. von Drasche-Wartinberg, dated Manila, 6th of December, 1875. He had already visited Réunion, Mauritius, the Seychelles and Ceylon, and had arrived at Manila on the 2nd of December. His guns and passport were still being detanied at the custom-house, and the authorities were by no means, friendly to strangers travelling in the country. Jagor's book on the Philippines had rendered them small service. It had been translated into Spanish, and forwarded by the Spanish government with a recommendation, but the local authorities would not allow it to pass, and priests and government officials were equally exasperated with the "German spy" who had exposed them.

A letter from G. von Helmersen was then read, in which that savant protests against the utopian views which were entertained in certain circles with respect to the navigability of the Sea of Kara, since Nordenskiöld had succeeded in reaching the mouth of the Yenisei. Pakhtusof's and Krusenstern's vessels had been crushed by the ice in the very strait through which Nordenskiöld passed into the Kara Sea, and that during the most favourable month of the year. It might be possible to enter this sea late in the summer, but he likened it to a mouse-trap, easy to enter, difficult to leave, and he for one should prefer a railway carriage to a ship's cabin when travelling to Siberia.

A letter from Dr. O. Lenz was then communicated to the Society.

Lieutenant Lux rendered an account of his journey from Loanda to Kimbundu in the country of the Kioko (see our report of the Berlin Society).

Dr. Toula described his journey into the Balkan Mountains.

In conclusion, the President directed attention to a project started by Baron Doblhoff for establishing a "Scientific Club," and invited the members to attend a meeting for that purpose.

* In a former number of the *Geographical Magazine* we advocated the formation of similar local associations in the United Kingdom. An examination into the physical geography, the topography, the statistics, and natural history of each country would offer ample scope to local explorers, and if conducted in a scientific spirit, would certainly prove useful to science. We do not see why, in addition to an "Alpine Club," there should not likewise exist "Snowdon" and "Grampian Clubs," whose task it would be to explore our own hills.

HAMBURG GEOGRAPHICAL SOCIETY.

February 3rd, 1876.—Dr. Kirchenpauer in the chair. Mr. Friederichsen stated that a telegram had been received from Bushir, by way of Tehran, dated 25th of January, from which they learned that Dr. Andres had begun his excavations at Kishekhr, and had already dug up 500 bricks with cuniform inscriptions. He proposed now to visit the ruins of Shapur and of Persepolis. He was accompanied by an official of the Indo-Persian Telegraph Service.

Dr. Güssfeldt, the late leader of the German African Expedition, then reported on the work done by them whilst on the Loango coast. Difficulties, which he had been unable to overcome, had prevented him from penetrating far into the interior. The station Chinchosho had certainly cost a large amount of money, but without it most of the scientific work performed by them would have been impossible. Meteorological observations had been continued during two years; they had obtained complete sets of magnetical observations, and amassed a large collection of botanical and zoological specimens.

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IMPERIAL RUSSIAN GEOGRAPHICAL SOCIETY.

Meeting of January 14th (26th), 1876.—M. P. Semenof, Vice-President, in the chair.

The publications of the Society during 1875 were laid on the table, viz., an ethnological map of Russia by M. Rittich, the fifth and sixth volume of *Memoirs on Universal Geography*, the eleventh volume of the *Memoirs of the Caucasus Section of the Society, &c.*

Reference was next made to losses among its members sustained by the Society during the past year:—M. Tchevkin, for eight years a member of council of the Society, and known for a remarkable account of the mining industry of Russia; M. Veronof, to whom the Society had twice awarded a prize for his historical and statistical researches in the subject of educational establishments in St. Petersburg; M. Timkovsky, known for his voyage in China, and others.

The various expeditions organized by or with the help of the Society, were next touched upon. At two stations on the river Amú-darya, meteorological observations had been carried on for a whole year by Messrs. Dorandt and Mulberg, and much light would by this means be thrown on the climatic and physical conditions of Central Asia. The laborious work of carrying a series of levels, mainly for topographical purposes, from Zveringolovsk in the Orenburg territory to Irkutsk, had not been completed during 1875, owing to the early winter, but had been carried to a point about 250 versts from Irkutsk, and would be accomplished during the present year, with the aid of the topographical staff of the Eastern Siberia division. The project of improving the means of communication along the fluvial highways of Siberia had attracted the notice of the Society, and on the invitation of General De Possiet, a programme had been drawn up of the geographical work which might be combined with the chief work of the expedition. It was proposed. to depute M. Lopatine to carry out the scheme sketched. M. Chekanofsky had made a journey to the mouths of the Lena to complete and supplement his previous observations, and M. Miklukho-Maklai had succeeded, by dint of great exertions, in reaching the interior of the Malay Peninsula, and in collecting some interesting ethnological information respecting the inhabitants.

Among the works which the Society had in hand, and which would probably be published during the current year were mentioned the second volume of *Prshevalsky's Travels;* a new volume of the Russian translation of *Ritter's Asia*, and other minor works.

After touching upon the part taken by the Society at the Paris Geographical Congress, announcement was made that the Constantine medal had been awarded to M. Strelbitsky, for his work on the calculation of the superficial area of the Empire of Russia; and the Lütke medal to M. Andreief, for his work on Lake Ladoga; while the small gold medals, in the sections of mathematical and physical geography, had been awarded to M. Gamazof, for his editing of the eleventh volume of the *Memoirs of the Caucasus Section*, which include an account of General Chinkof's journey in Persia, to M. Stoletof, as chief of the Amú-darya expedition; and to M. Solovief, for his article on Customs Duties in Russia. The silver medals, in the same sections, had been awarded to M. Lupandin, for his description of the Uzboï, or old bed of the Oxus; to M. Trofimenko, for his map of the Peninsula of Kola; to M. Kormazof, for the Chinese and Mongolian maps of the Chinese Empire, presented by him to the Society. Besides these, three silver medals in the sections of ethnography and statistics were awarded, and two bronze medals. Among the names of the gentlemen elected as honorary foreign members were those of Baron von Richthofen, Dr. Hochstetter, Dr. Farr and M. de Quatrefages.

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EGYPTIAN GEOGRAPHICAL SOCIETY.

January 26th, 1876.—Dr. G. Schweinfurth in the chair. The President announced the receipt of many valuable donations to the library, including a complete set of the *Journals* and *Proceedings* of the Royal Geographical Society of London, accompanied by a letter, in which the hospitality at all times exhibited to travellers in Egypt, was warmly acknowledged.

A telegram was forwarded to the Russian Geographical Society, congratulating it upon their 25th anniversary.

M. Ferdinand de Lesseps then spoke on the ancient geography of the Isthmus of Suez. He mentioned the principal historical personages who had crossed the Isthmus since the days of Abraham and his wife Sarah down to our own times, and spoke at length on the Exodus, opposing the views recently enunciated by Professor Brugsch, whom he regretted not to see amongst them. He invited the Society to appoint a scientific commission for thoroughly examining into the historical geography of the Isthmus, promising that the company of which he was president would afford it every facility.

General Stone then enumerated the various reconnaissances made by officers of his staff since 1871. In 1871-74 the explorations were confined principally to the desert between the Nile and the Red Sea, as far as the latitude of Korosko. They were carried on by Colonel Purdy, Colonel Colston, and Lieut.-Colonel Abd-el-Kader. In 1872 Colonel Mason explored the desert between the Fayum and the oasis of Siwah. In 1874 Colonel Long started with Gordon Pasha for the Upper Nile, and in 1875 he visited the country of the Makvaka, or Niam-Niams. In 1874-75 Colonels Purdy and Mason, attended by a strong military force, journeyed from Old Dongola to Fasher, the capital of Dar-Fur, and they have since been employed in preparing a map of that country. Colonel Purdy had since reached the Bahr-el-Ghazal. Colonel Mason, in 1874-75, conducted a reconnaissance into Kordofan. In 1875 Major Prout travelled from Suakim to Berber, and thence to Khartum, the position of which he is to determine by careful astronomical observations; whilst Mr. Mitchell examined into the geology of the Nile valley between Keneh and Kosseir, and of the environs of Zeyla. Munzinger Pasha, during his late unfortunate journey to Ausa, had likewise been accompanied by an officer of the staff by whom a map of the route followed had been prepared. Colonels Dyke and Derrick were at present attached to the Abyssinian expedition, but it was proposed that they should, at a more favourable opportunity, trace the Sobat to its sources.

The Marquis de Compiègne reported on the French expedition to the Ogowé, and on other explorations recently carried on in Western Africa.

Dr. Schweinfurth, with the aid of a large diagram, gave an account of Stanley's and Cameron's recent expeditions. He said that the connection between the Upper Nile at Gondokoro and the Albert Nyanza had not as yet been established beyond a doubt, in spite of Baker's long stay in that country, and every effort made by Gordon. He looked upon this connection as exceedingly probable, but it had not as yet been demonstrated scientifically. Amongst the arguments which spoke against it were the following:—(1) The Bahr-el-Gebel had not been traced to the Albert Nyanza, 75 miles remaining to be explored; (2) the Somerset River, which was 300 to 400 yards in width, carried a far larger volume of water than the Nile above Gondokoro, which was only 100 yards wide; (3) in the latitude of the Albert Nyanza the loss by evaporation and infiltration cannot be sufficiently great to account for this difference; (4) E. Marno had been told by Khartum travellers that the Nile did not rise in the Albert Nyanza, but in the hills to the north of it; (5) Colonel Gordon had heard that the river rose in the mountains, and only communicated with the lake by a creek; (6) Linant de Bellefonds had heard at Foweika that the Somerset flowed direct into the river at Gondokoro, and communicated with the Albert Nyanza only through an insignificant creek; (7) Sir Samuel Baker had been unable, whilst at Fatiko, to obtain conclusive information in this respect; (8) Lieutenant Chippendale had reached the latitude in which Baker placed the northern termination of his lake, and was then told that he was still three days' journey from it.

Dr. Schweinfurth thought we were not justified in speaking about the sources of the Nile with certainty, until this question of the connection between the Nile and Albert Nyanza had been settled. Baker's Lake was probably far smaller than it was represented to be on the map, for it was impossible, even with the aid of a telescope, to distinguish waterfalls at a distance of 60 miles, as Baker supposed he had done. That traveller mentioned, however, one fact which spoke in favour of the supposed connection, namely the occurrence of floating Pistiæ, which pointed to a lake, and was unknown on the Upper Nile, except between latitudes 8° and 10° N.

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MEXICAN GEOGRAPHICAL SOCIETY.

THIS Society during the past year has continued its weekly meetings under the presidency of Citizen Ignacio Ramirez, with Citizen Altamirano as secretary. The second volume of the proceedings for 1875 contains several valuable articles. The very interesting paper on the special product of Mexico, the *Agave Americana* (maguey, or American aloe), by Citizen Gaspar Sanchez Ochoa, contains a statement respecting which we should be glad to receive a reply from India. He says: "The Mexican *maguey* has been introduced into India by the English, but that region appears to be in no way favourable to the legitimate Aztec *maguey*. It has there become completely degenerate, and has lost all its peculiar qualities, its majesty, and its beauty." It certainly was not introduced into India by the English, but by the Portuguese. Its two great products, as is well known, are the abundant supply of juice whence the *pulque* is made, and the fibre of its leaves. The article is very complete and exhaustive. It is followed by an important contribution to political geography, consisting of a series of official documents, dating from 1762, on the subjects, of the exact boundary between Guatemala and the Mexican provinces of Chiapas and Soconusco. The greater part of these numbers is taken up with geological papers. A report on the trade of the Republic is also given, but owing to the dilatoriness of the custom-houses, these Mexican statistical returns are very late in coming out. The present report is for 1873, in which year the value of imported goods was $29,062,406; of which $10,180,589 represents English merchandise, $7,420,419 from the United States, $4,817,110 from France, and $3,890,496 from Germany. The little republic of Ecuador has a trade with Mexico of $10,430. The value of Mexican exports was $31,473,607; the largest quantity being shipped at Vera Cruz to the value of $17,938,889. Tampico and Mazattan follow with values of $2,904,226 and $2,726,100 respectively. Of this total sum as much as $25,373,673 represents the mineral trade, the value of the exported silver alone being $24,000,000. Skins and dye-woods follow, each worth $1,000,000; and then coffee, vanilla, tobacco, *ulé* or India-rubber ($93,052 or 93,052 cwts.), indigo, jalap, and hats. The cocoa trade has dwindled to 102 cwts., worth $2235. England is the largest customer, the value of Mexican exports shipped for this country being $12,479,547, the United States come next with $11,366,530, then France with $4,604,417, and Panama with $1,579,015.

There has been a great increase in the export of coffee, from $528 in 1825, to $532,912 in 1873. The export of silver has more than doubled in the same time.

The total value of Mexican exports and imports for 1873 was $60,753,557; the trade with England being by far the largest, and worth $22,650,156, with the United States $18,786,950. Since Mexico became an independent Republic, the value of her annual trade has increased by $36,574,606.

Personalia.

DR. ASCHERSON, the botanist, proposes to pay a visit to Bahariah or Little Oasis.

Drs. GUSSFELDT and SCHWEINFURTH intend to visit the monasteries of St. Paul and St. Antonius, in the hills between the Nile and the Red Sea, which have not been visited by a European for forty years past.

HILDEBRANDT'S first effort to penetrate from the east coast of Africa into the interior has failed from the impossibility of procuring carriers at Lamu. He has returned to Mombasah, and proposes now to make an effort to reach the southern extremity of the Tanganyika from Bagomayo.

The COMMITTEE of the BEKE TESTIMONIAL FUND have collected 395*l*. They have furnished a house for Mrs. Beke at Tunbridge Wells, and handed over to her the balance. A memorial is to be presented to the Queen, praying her to grant an annuity to Mrs. Beke.

Dr. J. REIN has been appointed Professor of Geography at the University of Marburg. The chair vacated by the late O. Peschel, at Leipzig, has been offered to Dr. Schweinfurth.

NOTICE.

The Office of THE GEOGRAPHICAL MAGAZINE *is at* 57 *&* 59, *Ludgate Hill, E.C.*

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Letters and Articles intended for insertion should be written on one side of the paper only, and must be accompanied by the name and address of the writer; not for publication, but as a mark of good faith.

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MAP OF KHOKAND (FERGHANA)

Scale 1 : 1500,000.

0 10 20 30 40 Brit. Statute Miles.

0 10 20 30 40 50 Russian Versts.

70° 71° 72° 73° 74°

42 41 40

KHOKAND

Andijan

Namangan

Just

Ike Su

Kendyr Tau

Urtak Tau

Ak Tau

Kuruma

Iykend

Alai

Trans Alai Mts.

ALAI PLATEAU

Kara Kul

KARATIGIN (to Bokhara)

E. G. Ravenstein autogr.